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PART IV

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

■

GROUNDFISH OF THE GULF OF ALASKA

Fishery Management Plan

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[50 CFR Part 672]

GROUNDFISH OF THE GULF OF ALASKA

Proposed Regulations

AGENCY: National Oceanic and Atmospheric Administration/Commerce.

ACTION: Proposed regulations.

SUMMARY: This document sets forth proposed regulations for domestic fishing to implement a Fishery Management Plan for Groundfish in the Fishery Conservation Zone (FCZ) of the Gulf of Alaska. The plan was approved by the Secretary of Commerce on February 24, 1978, pursuant to the Fishery Conservation and Management Act of 1976.

DATE: Comments will be received until: June 6, 1978.

ADDRESS: Comments should be addressed to: Assistant Administrator for Fisheries, NOAA, 3300 Whitehaven Street NW., Washington, D.C. 20235.

FOR FURTHER INFORMATION CONTACT:

Harry Rietze, Director, Alaska Region, National Marine Fisheries Service, Box 1668, Juneau, Alaska 99802. Telephone 907-586-7221.

SUPPLEMENTARY INFORMATION: The Fishery Conservation and Management Act of 1976, Pub. L. 94-265, as amended, 16 U.S.C. 1801 et. seq. (the "Act"), authorizes the Secretary of Commerce (the "Secretary") to promulgate regulations implementing approved fishery management plans prepared by the Regional Fishery Management Councils for their geographic areas of concern.

Pursuant to Title III of the Act, the North Pacific Fishery Management Council prepared and submitted to the Secretary a fishery management plan (FMP) for selected groundfish in the Fishery Conservation Zone (FCZ) of the Gulf of Alaska. The FMP was approved by the acting Assistant Administrator for Fisheries pursuant to an appropriate delegation of authority from the Secretary of Commerce.

The fishery management plan supercedes the preliminary management plan (PMP) for the Gulf of Alaska Trawl Fishery, as amended, and that portion of the PMP for Sablefish of the Bering Sea and Northeastern Pacific Ocean, as amended, applicable to the Gulf of Alaska (and the regulations implementing these PMP's: 50 CFR 611.92 and 611.94, 42 FR 60681, 60697-99, November 28, 1977).

The FMP covers domestic fishing for cod, pollock, flounders, Pacific ocean perch, other rockfish, sablefish, Atka mackerel, squid and all other stocks of fish (except it does not regulate domestic fishing for salmon, steelhead trout, Pacific halibut, herring and tuna) in the FCZ in the Gulf of Alaska. The taking of Pacific halibut by U.S. and Canadian fishermen is regulated under the auspices of the International Pacific Halibut Commission. The FMP is published herewith.

Four major objectives control the philosophy of management of the groundfish fisheries in the Gulf of Alaska. They are:

(A) Rational and optimal use, in both the biological and socio-economic sense, of the region's fishery resources as a whole;

(B) Protection of the Pacific halibut resource, currently in a state of decline;

(C) Orderly development by the U.S. of domestic groundfish fisheries, consistent with (A) and (B) above; and

(D) Foreign participation in the fishery consistent with (A), (B), and (C) above, to take that portion of the optimum yield not harvested by domestic fishermen.

To achieve these objectives in the context of a workable management plan, the FMP and these regulations propose coordinated application of several management techniques, including season, gear, area and catch restrictions for domestic and foreign fisheries. (Regulations for foreign fisheries within the FCZ under this FMP have been proposed in the form of amendments to Part 611, Foreign Fishing Regulations.)

Area Restrictions. The FMP and proposed regulations establish optimum yields (OY) for each groundfish species in each of five major statistical areas. The purpose of establishing OY's in each statistical area is to avoid the overfishing of local stocks which has taken place in the past. When OY for any species in the statistical area is reached, the area is closed to all fishing for the remainder of the season.

Reserve. The FMP has set aside a portion of the Optimum Yield as a reserve to be allocated on a quarterly basis to domestic or foreign fisheries, based upon reassessment of domestic harvesting capacity. The purpose of the reserve is to allow foreign and domestic fisheries to proceed concurrently while still assuring (a) that resources are available to domestic fisheemen to the extent of their capacity to harvest, and (b) that optimum use will be made of fishery resources to the extent that domestic fishermen will not harvest these resources.

Protection of Halibut Resource. The FMP and proposed regulations include gear and catch restrictions on domestic fishermen (and gear, catch and area restrictions on foreign fishermen) for the purpose of protecting halibut stocks. These restrictions include closing a statistical area to domestic fishing when incidental catch of halibut reaches a specified level.

In-season Adjustments. The FMP and proposed regulations permit the National Marine Fisheries Service (NMFS) Regional Director to make in-season adjustments to domestic season closing dates for conservation purposes. This provision is intended to provide management flexibility in situations where conservation of the groundfish resource requires immediate action.

Notice of all closures authorized by these proposed regulations is given to vessels of the United States by publishing the notice in the FEDERAL REGISTER and by posting and use of other procedures presently used by the State of Alaska for similar notices of closure. If these mechanisms are insufficient, other measures such as designation of fishermen's associations as on-shore agents, for purposes of notice, may be considered.

Reporting Requirements. The reporting requirements of the proposed regulations contemplate delivery of U.S.-caught groundfish to on-shore processors. Should direct delivery to foreign vessels be permitted, the reporting requirements for both foreign and U.S. vessels would be modified to assure receipt of accurate information about the groundfish resource.

Agreement with the State of Alaska. Under the FMP and these proposed regulations, certain responsibilities relating to licensing, data collection and enforcement would be performed by the State of Alaska, under contract from NOAA/NMFS.

Implementation of these proposed regulations depends in part upon concluding a separate agreement with the State of Alaska to assure that these responsibilities are carried out in a manner consistent with the FCMA and the FMP.

Scientific Observers. The FMP and proposed regulations require any vessel of the United States which is subject to these regulations to take aboard a scientific observer when so requested by the Regional Director.

All interested parties are encouraged to submit written comments, views or data concerning both the FMP and these proposed regulations, which would implement the approved plan. In particular, NMFS encourages submission of comments relating to practical problems which will be encountered in implementing this management plan, and comments relating to the least disruptive means of implementing this FMP at mid-season. Comments may be submitted to the Assistant Administrator for Fisheries, NOAA, 3300 Whitehaven Street NW., Washington, D.C. 20235. All such submissions received before June 4, 1978, will be considered before final action is taken on the implementing regulations.

Signed in Washington, D.C., this 11th day of April 1978.

WINFRED H. MEIBOHM,
Associate Director,
National Marine Fisheries Service.

PART 672—GROUNDFISH OF THE GULF OF ALASKA

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AUTHORITY: 16 U.S.C. 1855.

§ 672.1 Purpose.

(a) Regulations in this part govern fishing by vessels of the United States in the groundfish fishery of the FCZ in the Gulf of Alaska.

(b) Fishing in the Gulf of Alaska by vessels of the United States for the following stocks must be conducted in accordance with these regulations: pollock, cod, flounders, Pacific ocean perch, other rockfish, sablefish, Atka mackerel, squid, and all other stocks of finfish (except salmon, steelhead trout, Pacific halibut, herring and tuna).

§ 672.2 Definitions.

The terms used in these regulations shall have the meanings that are prescribed in section 3 of the Fishery Conservation and Management Act of 1976 (the Act). In addition, the following definitions apply:

(a) *ADF&G* means the Alaska Department of Fish and Game.

(b) *Assistant Administrator* means the Assistant Administrator for Fisheries, NOAA, or a designee.

(c) *Authorized officer* means:

(1) Any commissioned, warrant, or petty officer of the Coast Guard;

(2) Any certified enforcement or special agent of the National Marine Fisheries Service;

(3) Any officer designated by the head of any Federal or State agency which has entered into an agreement with the Secretary or the Secretary of the Department of Transportation to enforce the provisions of the Act; and

(4) Any Coast Guard personnel accompanying and acting under the direction of any person described in subparagraph (1) of this paragraph.

(d) *Directed fishery,* with respect to any species, means a fishery conducted for the purpose of catching that species.

(e) *Gulf of Alaska* means that portion of the fishery conservation zone (FCZ) in the North Pacific Ocean seaward of the State of Alaska exclusive of the Bering Sea, between 132°40′ W. longitude and 170° W. longitude.

(f) *Incidental catch* means fish of any species, other than the directed fishery species, which are caught during a directed fishery.

(g) *Longline* means a stationary, buoyed and anchored line or a floating free-drifting line, with lures, baited hooks, or pots attached.

(h) *Off-bottom trawl* means a trawl in which the otter boards may be in contact with the bottom but the ground rope of the net always remains above the bottom.

(i) *Pelagic trawl* means a trawl in which neither the net nor the otter boards operates in contact with the bottom.

(j) *Regional Director* means Director, Alaska Region, National Marine Fisheries Service, Box 1668, Juneau, Alaska 99802, or a designee.

(k) *Species*—The following terms shall have the meanings indicated:

Pollock means *Theragra chalcogrammus.*
Cod means *Gadus macrocephalus.*
Arrowtooth flounder means *Atheresthes stomias.*
Other flounder means *Pleuronectiformes* (order) not specifically defined.
Rock sole means *Lepidopsetta bilineata.*
Flathead sole means *Hippoglossoides elassodon.*
Pacific ocean perch means *Sebastes alutus.*
Atka mackerel means *Pleurogrammus monopterygius.*
Other rockfish means *Scorpaenidae* (family) not specifically defined.
Sablefish means *Anoplopoma fimbria.*
Salmonids means of the family *Salmonidae.*
Pacific halibut means *Hippoglossus stenolepis.*
Herring means *Clupea harengus pallasi.*

(l) *Statistical area* means an area of the FCZ seaward of the State of Alaska, previously established under the International North Pacific Fisheries Commission, for the general purposes of research, reporting and/or regulation. The five statistical areas in the Gulf of Alaska are described as follows:

Shumagin	between 170–159° West Longitude
Chirikof	159–154° West Longitude
Kodiak	154–147° West Longitude
Yakutat	147–137° West Longitude
Southeastern	137–132°40 West Longitude

§ 672.3 Domestic annual harvest, optimum yield, and reserve.

(a) Domestic annual harvest (DAH) and optimum yield (OY) for all species in the Gulf of Alaska regulated under this Part 672 are established in each of the five major statistical areas, as shown in Table I below:

TABLE I.—*Metric tons*

Species		Shumagin	Chirikof	Kodiak	Yakutat	Southeast	Total
Pollock	OY	57,000	54,400	40,800	12,500	4,100	168,800
	DAH	4,800	4,600	3,400	1,100	300	14,200
Cod	OY	9,600	4,100	15,300	4,300	1,500	34,800
	DAH	4,300	1,800	6,800	1,900	700	15,500
Flounder	OY	10,400	2,700	12,000	6,400	2,000	33,500
	DAH	2,200	600	2,600	1,400	400	7,200
Pacific Ocean perch (POP)	OY	2,700	2,700	5,200	7,900	6,500	25,000
	DAH	100	100	200	400	300	1,100
Other rockfish	OY	300	200	600	3,400	3,100	7,600
	DAH	100	(1)	200	900	800	2,000
Sablefish	OY	2,100	1,400	2,400	3,400	3,700	13,000
	DAH	100	(1)	100	800	3,000	4,000
Atka mackerel	OY	4,400	3,600	15,800	1,000	0	24,800
	DAH	0	0	0	0	0	0
Squid	OY	400	400	400	400	400	2,000
	DAH	0	0	0	0	0	0
Other species*	OY	4,400	3,600	5,000	2,100	1,100	16,200
	DAH	100	100	200	100	(1)	500

*All stock of finfish except: (1) those listed above; and (2) salmon, steelhead trout, Pacific halibut, herring, and tuna.
1 Trace.

(b) Optimum yield represents the total amount of each species which may be harvested by the all-nation fishery in each statistical area during any fishing season. When the Regional Director determines that the OY for any species in any statistical area has been reached, he shall close that statistical area for the remainder of the year to all foreign and domestic fishing even if OY's for other species in that statistical area have not been reached. Notice of any such closure shall be gven to domestic fishermen in accordance with the procedures in § 672.5.

(c) In any statistical area where the OY for any species is listed in Table I of this section as "O" (zero), any catch of that species in that area shall be returned to the sea immediately with a

minimum of injury regardless of its condition.

(d) The DAH's set out in Table I of this section have been subtracted from 80 percent of the optimum yield to determine the initial total allowable level of foreign fishing, leaving 20 percent of the OY set aside in a reserve. Quarterly during the year, the Regional Director may apportion all or part of this reserve to the domestic or foreign fisheries on the basis of a continuing reappraisal of DAH.

§ 672.4 Incidental catch of halibut.

(a) When the Regional Director determines that the estimated total incidental trawl catch of halibut in any statistical area during the period from December 1 through May 31 of any fishing season reaches the amount listed below, he shall close that statistical area to trawling by vessels of the United States for the remainder of that period.

Shumagin, 29 metric tons (mt)
Chirikof, 18 mt
Kodiak, 34 mt
Yakutat, 17 mt
Southeast, 14 mt.

(b) Notice of any such closure shall be given by the Regional Director in accordance with the provisions of section 672.5.

§ 672.5 Time and area closures.

(a) If the Regional Director decides to close any area pursuant to the provisions of § 672.3(b), § 672.4 or § 672.8, he shall issue a field order which includes the following information: (1) The reason for the closure; (2) a description of the area to be closed; and (3) the effective date of such closure.

(b) No field order issued under this section shall be effective until:

(1) It is published by the Assistant Administrator in the FEDERAL REGISTER;

(2) It has been posted for 48 hours, and otherwise made available to the public, in accordance with procedures customarily used by the ADF&G for posting and publicizing of similar notices of closure; and (3) it has been broadcast for 48 hours at those time intervals, channels, and frequencies customarily used by the ADF&G to broadcast similar notices of closure.

§ 672.6 Gear restrictions.

(a) *Trawl.* During the period from December 1 through May 31:

(1) No vessel subject to these regulations may use any trawl other than:

(i) An off-bottom trawl, or

(ii) A pelagic trawl equipped with recording net-sonde devices functioning properly during each tow;

(2) Duration of individual tows using off-bottom trawls shall not exceed one hour.

(3) When using pelagic trawls the footrope of the net shall not be in contact with the bottom for more than 10 percent of any tow, as indicated by the net-sonde read-out.

§ 672.7 Scientific observers.

All vessels subject to this section must, when so requested by the Regional Director, take aboard a scientific observer.

§ 672.8 In-season adjustments.

(a) The Regional Director may, following consultation with the ADF&G, adjust season closing dates in amy portion of the Gulf of Alaska groundfish fishery.

(b) Any such adjustment shall be based on a determination by the Regional Director that (1) the condition of any groundfish stock in any portion of the Gulf of Alaska is substantially different from the condition anticipated at the beginning of the fishing season, and (2) such differences reasonably support the need for in-season conservation measures to protect groundfish or halibut stocks.

(c) Fishery and observer data reported in-season which relates to one or more of the following factors may be considered in making this determination:

(1) The effect of overall fishing effort within a major statistical area;

(2) Catch per unit of effort and rate of harvest;

(3) Relative abundance of stocks within the area;

(4) Amount of halibut being caught;

(5) Condition of stocks within the area; and

(6) Any other factors relevant to the conservation of the groundfish resource.

(d) The Regional Director shall make any such in-season adjustment by issuance of a field order in accordance with the procedures set out in § 672.5.

§ 672.9 Reporting requirements.

(a) The operator of any vessel of the United States subject to these regulations shall, for each sale of delivery of any species of fish covered by these regulations, submit an accurately completed State of Alaska fish ticket. The fish ticket shall be submitted to the Regional Director within 72 hours after such fish were sold or delivered.

(1) In addition to the requirements of paragraph (a) of this section, each operator shall also accurately state on each such fish ticket: (i) total time fished, (ii) total number of hauls, and (iii) quantity and type of gear used.

(b) The operator of any vessel of the United States subject to these regulations whose port of landing is outside the State of Alaska may comply with the provisions of this section by mailing a completed Alaska fish ticket or a document containing all of the required information to the Regional Director within 72 hours after the date of each sale or delivery of any species of fish covered by these regulations. [Sample alternative document reserved.]

§ 672.10 Permit requirements.

(a) Any owner or operator of a vessel of the United States desiring to engage in fishing in the groundfish fishery in the Gulf of Alaska must first obtain a permit for that purpose.

(b) The permit may be obtained by submitting a completed State of Alaska commercial fishing license application to the Regional Director. The Regional Director shall issue the requested permit without fee, for an indefinite term, such term to include the calendar year in which the license is issued.

(c) A permit issued pursuant to this sectioin shall be carried at all times on board the vessel for which it is issued, and such permit, the vessel, its gear and equipment and catch be subject to inspection by authorized officers.

(d) Permits issued pursuant to this section may be modified or revoked by the Regional Director for violation of the Act or these regulations.

§ 672.11 Penalties.

Any person or vessels found to be in violation of these regulations will be subject to the civil and criminal penalty provisions prescribed in the Act and 50 CFR Parts 620 and 621.

FISHERY MANAGEMENT PLAN FOR THE GULF OF ALASKA GROUNDFISH FISHERY DURING 1978

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

SUMMARY

Gulf of Alaska groundfish fishery during 1978

The Gulf of Alaska Groundfish Fishery Plan was prepared by the North Pacific Council's groundfish management plan drafting team comprised of personnel from NMFS's Northwest and Alaska Fisheries Center and Alaska Regional Office; Alaska Department of Fish and Game; Alaska Commercial Fishery Entry Commission; University of Washington, International Pacific Halibut Commission and the Council's Advisory Panel.

The plan is designed to promote conservation of the groundfish resource while allowing utilization of its various components with particular reference to food production and the conservation and rehabilitation of halibut stocks.

An integral part of the plan is the management regime proposed to regulate foreign and U.S. fishing efforts which will ensure maximum long-term productivity of the resources.

Included is a comprehensive history of the fishery of the Gulf of Alaska and extrapolations showing stock(s) strength, predicted harvest totals of the domestic fishery effort and stocks expected to be made available to foreign fishing efforts.

Optimum yield evaluations have been made for each of the species or species

groups represented in the groundfish resource. This yield is expected to be about 325,700 metric tons.

The principal groundfish species represented in the Gulf of Alaska fishery are considered to be resident in that area and include Alaska pollock, Pacific cod, sablefish, Pacific ocean perch, halibut, turbot, flathead sole, rock sole and Atka mackerel. Of the total expected harvest in 1978, nearly half, or 169,000 metric tons, will be pollock.

Current projections indicates that U.S. fishermen expect to deliver some 44,500 metric tons of groundfish to shore-based processors.

Plan objectives, in addition to conservation measures designed to obtain optimum yield, include promoting the efficient use of the fishery resources but not solely for economic purposes; promotion of a fair and equitable allocation of identified available resources in such a manner that no particular user group acquires an excessive share of the privileges, development of a U.S. groundfish fishery as rapidly as is consonant with good conservation practices, and finally, basing the plan on the best scientific information possible.

Historically, the plan shows more than a century of commercial exploitation in the Gulf of Alaska fishery. The oldest fishery is the Native subsistence fishery which predates records; this was followed by a setline fishery by U.S. nationals for Pacific cod in 1867 with later fisheries developed on halibut, sablefish and groundfish. The first foreign effort of note was by Canadians during the first portion of this century for halibut.

The Asian trawl fisheries on Gulf of Alaska groundfish began in 1962 with the appearance of a Russian fleet consisting of 70 trawlers and support vessels, the effort being directed on Pacific ocean perch. The following year a smaller Japanese fleet entered the Gulf and fished for Pacific ocean perch and sablefish. From this beginning, the Asian trawl fishery expanded rapidly and their combined effort result in excessive annual catches that ranged to a peak of 380,000 metric tons in the middle 1960's. The perch fishery peaked in 1965 and has since declined to about 48,000 mt (1974). The Asian trawl fisheries dwarfs the effort of the United States and Canada combined and is directed primarily toward stocks of pollock, perch, sablefish, flounders and Atka mackerel.

The commercial fishery for halibut began in coastal waters of Washington and British Columbia and expanded into the Gulf of Alaska following World War I. Depletion of the resource by both U.S. and Canadian nationals led to a treaty between the U.S. and Canada to regulate the fishery and conduct research. Signed in 1923, the Convention established the International Fisheries Commission, later renamed the International Pacific Halibut Commission.

A combination of overfishing and environmental factors caused a continued decline in the numbers of halibut and in 1930 a new Convention was signed broadening the Commission's regulatory powers for rebuilding of the halibut stocks.

The fishery was gradually rebuilt and resulted in an all-time high landing of halibut (1962) of 24,000 mt. High annual catches continued until 1966 at which time a decline began so that by 1974 landings consisted of only 7,300 mt, the greatest portion of which came from central Gulf of Alaska. For the 20-year period 1955—75, between 65 and 80 percent of the total halibut landed came from the Gulf of Alaska.

Japanese fishing in the Gulf of Alaska first became significant in 1960. Exploration continued for several years and in 1963 large trawlers were introduced. Their target was, and continues to be, Pacific Ocean perch with substantial amounts of other groundfish taken.

This Japanese effort was undoubtedly spurred by the increased activity of the Russian fishing industry. Japan had shown prior constraint in pursuing a Gulf trawl fishery, at least partly in consideration for the potential impact that effort might have on halibut.

The Republic of Korea entered the fishery in 1972, five years after their Bering Sea operations had begun. They began by longlining for sablefish but have also had substantial trawl operations.

Poland conducted small fisheries efforts on Gulf of Alaska groundfish in 1974 and 1975 with reported catches of 2,000 mt in 1975; the catches were mostly pollock, Atka mackerel and rockfish.

A Taiwanese longliner began fishing in the Gulf of Alaska in 1975. Three longliners and a factory stern trawler were observed in the Gulf in 1976.

Regulatory measures currently in effect are those established by the State of Alaska, the International North Pacific Fisheries Convention, the International Pacific Halibut Commission, and the implementing regulations for the preliminary management plans (foreign only) effective March 1, 1977.

Prior to the implementation of the Fishery Conservation and Management Act of 1976, the only regulation on the foreign fishery was a series of bilateral agreements between the United States and Japan, the Soviet Union, Republic of Korea, Republic of China, and Poland. In addition, Federal acts controlled the foreign fishery within 12 miles of the coast and those species considered "creatures of the Continental Shelf." Enforcement power under the bilateral agreements was allotted to the flag country.

The management regime draws from many different sources concerning groundfish stocks for allowable catches and efforts. Seasons, allocations among user groups, restrictions as to times, gear, quantities, methods, etc., are detailed and explained with references both historic and current.

The management provisions adopted by the North Pacific Council are based on a policy of protecting and rebuilding the halibut resource in the Gulf of Alaska and within that parameter encouraging as rapid a growth as possible of the U.S. groundfish fishery. To further that goal, the Council makes the following recommendations:

1. Close the Gulf of Alaska east of 140° West longitude to all foreign longlining. Elsewhere prohibit foreign longlining landward of the 500 meter isobath, except that a directed Pacific cod longline fishery may be conducted landward of the 500 meter isobath west of 157° West longitude, except during the halibut season as set by the International Pacific Halibut Commission. Reduce the optimum yield for sablefish to 13,000 metric tons for the entire Gulf to encourage rapid rebuilding of these stocks to MSY and increase the size of fish available. These measures are designed to encourage the U.S. longline fishery and protect halibut.

2. Recommend the initial foreign allocation of surplus stocks be computed by the following formula: OY−(20% of OY=DAH)=initial foreign allocation. The 20 percent of OY held as a reserve should be reallocated either to the foreign fisheries or to the domestic fishery in-season, following a reassessment of U.S. development.

3. Base DAH on the estimated catch by U.S. fishermen to be delivered to U.S. processors. They recommend that joint ventures involving the delivery of raw fish to foreign processors by U.S. fishermen be prohibited until July 1, 1978, when the concept should be reevaluated in light of U.S. performance in the groundfish fishery to that time.

4. Distribute the OY through the five INPFC statistical areas in the Gulf of Alaska proportional to the biomass of the stocks found in those areas. This provision to apply both to U.S. and foreign fishermen.

5. Establish three no-trawling areas for foreign fishermen off Southeastern Alaska to protect the expanding U.S. sablefish longline fishery.

6. Close the U.S. trawl fishery when the incidental catch of halibut reaches a certain point.

7. Develop an observer program aboard U.S. trawlers to gather information on the developing groundfish fishery and monitor the incidental catch of halibut.

Section 12 of the plan sums up the environmental impacts expected from promulgation of this plan.

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2.0 Introduction.

This Fishery Management Plan has been developed by the North Pacific Fishery Management Council and is for the groundfish fishery (excluding Halibut) of the Gulf of Alaska during 1978. It is intended to replace the current Preliminary Fishery Management Plan (PFMP) for the trawl fishery of the Gulf of Alaska and that portion of the PFMP for the sablefish setline/trap fishery which deals with the Gulf of Alaska. Both of those PFMP's were developed by the National Marine Fisheries Service and implemented by the Secretary of Commerce in early 1977.

In terms of both the fishery and the groundfish resource, the Gulf of Alaska groundfish fishery (excluding Halibut) forms a distinct management unit. The history of fishery development, target species and species composition of the commercial catch, bathemetry, and oceanography are all much different in the Gulf than in the adjacent Bearing Sea/Aleutian and British Columbia to California regions. Although many species occur over a broader range than the Gulf of Alaska, with only a few exceptions (e.g. halibut and perhaps sablefish) stocks of common species in the Gulf are believed different from those in adjacent aregions.

Even though the International Pacific Halibut Commission is responsible for management of the North American halibut fishery, the potential adverse impact on halibut of a fishery for opther groundfish species is so great that it must be taken into account in the management of the groundfish fishery. Therefore, certain pertinent aspects of the halibut resource and the directed fishery it supports are described in this Fishery Management Plan. Throughout this document, the term "groundfish" and "bottomfish" exclude Pacific halibut unless otherwise noted. Fishery Management Plan follows almost exactly the "Outline for Fishery Management Plans" adopted by the North Pacific Council and forms the major component of an Environmental Impact Statement which assesses the effect that implementation of this Plan is expected to have on the environment of the region which encompasses the Gulf of Alaska.

2.1 Goals and objectives for management plan.

This management plan is designed to meet the requirements of the Fishery. Conservation and Management Act of 1976 and its National Standards by achieving the following objectives:

1. Promote conservation while providing for the optimal yield from the Gulf of Alaska groundfish resource in terms of: providing the greatest overall benefit to the nation with particular reference to food production and recreational opportunities; avoiding irreversible or long-term adverse effects on fishery resources and the marine environment; and insuring availability of a multiplicity of options with respect to the future uses of these resources.

2. Promote, where possible, efficient use of the fishery resources but not solely for economic purposes.

3. Promote fair and equitable allocation of identified available resources in a manner such that no particular group acquires an excessive share of the privileges.

4. Base the plan on the best scientific information available.

In accomplishing these broad objectives a number of secondary objectives have been considered:

a. Conservation and management measures have taken into account the unpredictable characteristics of future resource availability and socio-economic factors influencing the viability of the industry.

b. Where possible, individual stocks of fish are managed as a unit throughout their range, but such management is in due consideration of other impacted resources.

c. In such instances when stocks have declined to a level below that capable of producing MSY, management measures promote rebuilding the stocks. In considering the rate of rebuilding, factors other than biological consideration have been taken into account.

d. Management measures, while promoting efficiency where practicable, are designed to avoid disruption of existing social and economic structures where fisheries appear to be operated in reasonable conformance with the Act and have evolved over a period of years as reflected in community characteristics, processing capability, fleet size and distribution. These systems and the resources upon which they are based are not static, but change in the existing regulatory regime should be the result of considered action based on data and public input.

e. Management measures should contain a margin of safety in recommending allowable biological catches when the quality of information concerning the resource and the ecosystem is questionable. Management plans should provide for accessing biological and socio-economic data in such instances where the information base is inadequate to effectively establish the biological parameters of the resource or to reasonably establish optimum yield. This plan has identified information and research required for further plan development.

f. Fishing strategy has been designed in such a manner as to have minimal impact on other fisheries and the environment.

2.2 Operational definitions of terms.

1. Determinants of catch levels. a. Maximum sustainable yield (MSY) is an average over a reasonable length of time of the largest catch which can be taken continuously from a stock under current environmental conditions. It should normally be presented with a range of values around its point estimate. Where sufficient scientific data as to the biological characteristics of the stock do not exist or the period of exploitation or investigation has not been long enough for adequate understanding of stock dynamics, the MSY will be estimated from the best information available.

b. Equilibrium yield (EY). The annual or seasonal harvest which allows the stock to be maintained at approximately the same level of abundance (apart from the effects of environmental variation) in succeeding seasons or years.

c. Acceptable biological catch (ABC) is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years for species with fluctuating recruitment. It may be set lower than MSY in order to rebuild overfished stocks.

d. Optimum Yield (OY) may be obtained by a plus or minus deviation from ABC for purposes of promoting economic, social or ecological objectives as established by law and public participation processes. Ecological objectives, where they primarily relate to biological purposes and factors are included in the determination of ABC. Where biological objectives relate to resolving conflicts and accommodating competing uses and values, they are included as appropriate with economic and/or social objectives. OY may be set higher than ABC in order to produce higher yields from other more desirable species in a multi-species fishery. It might be set lower than ABC in order to provide farger sized individuals or a higher average catch per unit effort.

2. Determination of domestic annual fishing capacity and expected harvest. a. Domestic annual fishing capacity (DAC) is the total potential physical capacity of the fleets, modified by logistic factors. The components of the concept are:

(1) An inventory of total potential physical capacity, defined in terms of appropriate vessel and gear characteristics (e.g., size, horsepower, hold capacity, gear design, etc.).

(2) Logistic factors determining total annual fishing capacity (e.g., variations in vessel and gear performance, trip length between fishing locations and landing points, weather constraints, etc.).

b. Expected domestic annual fisheries harvest (DAH) is the domestic annual fishing capacity modified by other factors which will determine estimates of what the fleets will harvest (e.g., how fisherman will respond to price changes in the subject species and other species, etc.).

These concepts should be placed in a dynamic context of past trends and future projections. For example, physical fleet capacity should not simply be last season's inventory of vessels and hold measurements (although this is appropriate for present interim planning), but also next year's projected movement into and out of the fishery. Vessels under construction should be included and attrition should be estimated.

The determination of domestic annual fishing capacity and expected harvest should be made on the best available information.

3. Determination of foreign allowable catch (FAC). The foreign allowable catch is determined by deducting the expected domestic annual expected harvest from the optimum yield.

3.0 Description of the fishery.

3.1 Areas and stocks involved.

The Gulf of Alaska is defined to include that portion of the North Pacific Ocean exclusive of the Bering Sea, between the eastern Aleutian Islands at 170°W and Dixon entrance at 132°40'W and includes the following major statistical areas: Shumagin, Chirikof, Kodiak, Yakutat, and Southeastern (Figure 1). Total area of Continental Shelf in the Gulf of Alaska is about 160,000 square km, which is more than the shelf area in the Washington-California region but less than 25 percent of that in the eastern Bering Sea. Between Canada and Cape Spencer in the Gulf of Alaska the Continental Shelf is narrow and rough. North and west of Cape Spencer it is broader and ore suitable for trawling. As it curves westerly from Cape Spencer towards Kodiak Island it extends some 50 miles seaward, making it the most extensive shelf area south of the Bering Sea. West of Kodiak Island and proceeding along the Alaska Peninsula toward the Aleutian Islands, the shelf gradually becomes narrow and rough again.

Diversity of commercial bottomfish species in the Gulf of Alaska is intermediate between the Bering Sea, where the fewest species occur, and the Washington-California region, where the most species are present. Much of the reduced diversity in the Gulf of Alaska results from a simplification in the rockfish community (Scorpaenidae). For example, in the Oregon-Washington

region a total of 22 species of rockfishes (genus *Sebastes* and *Sebastolobus*) were encountered in exploratory fishing surveys, while in the Gulf of Alaska only 13 species were identified and only 5 occurred in more than trace quantities (Alverson, et al, 1964). In the Alaska Peninsula region only six species of rockfish were encountered. Only one species or rockfish, Pacific ocean perch (*Sebastes alutus*) has been the target of a major fishery in the Gulf of Alaska.

The relative abundance of fishes in the cod family (Gadidae) is also different in the Gulf of Alaska compared to the other regions. Pacific hake (*Merluccius productus*), the most abundant of the cod-like fishes off Washington-California, is present only in the southern portion of the Gulf and generally not in commercial quantities. Pollock (*Theragra chalcogramma*), the dominant "cod" and largest element in the bottomfish biomass of the Bering Sea, is much less abundant in the Gulf of Alaska and becomes progressively scarcer to the south until it is practically absent off Oregon. However, the abundance of pollock in the Gulf of Alaska has increased by perhaps an order of magnitude during the past decade or so coincident with a reduction in the abundance of Pacific ocean perch and sablefish (*Anoplopoma fimbria*). Pollock now appear to comprise the largest exploitable biomass within the gadoid community in the Gulf, approaching perhaps that of Pacific hake in the Washington-California region but far smaller than that of pollock in the Bering Sea. Pacific cod (*Gadus macrocephalus*) may reach its greatest level of abundance in the Gulf.

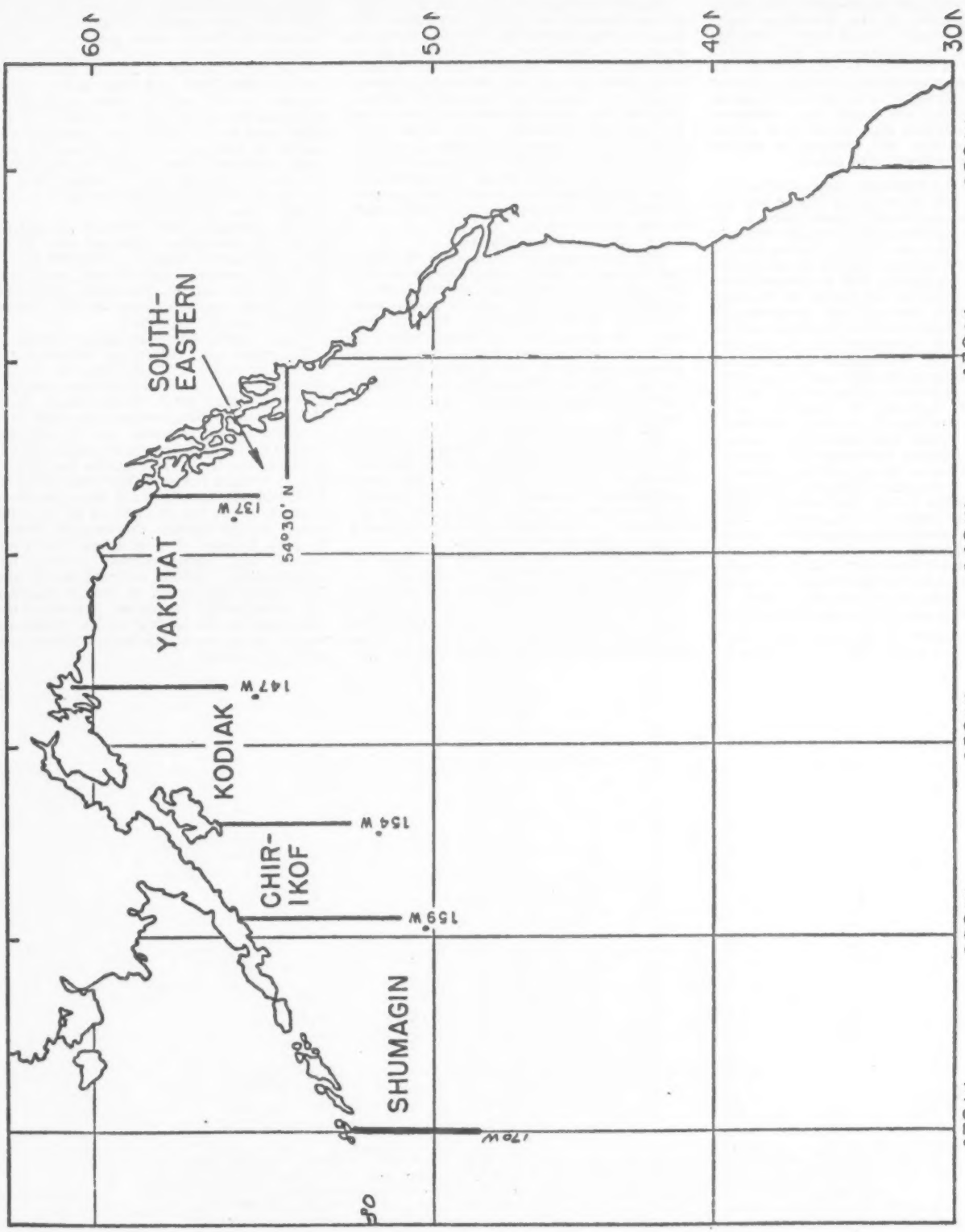


Figure 1.--Major statistical areas of the Gulf of Alaska.

Other abundant groundfishes which have been the target of fisheries in the Gulf include sablefish and the so-called Atka mackerel, a member of the greenling family (Hexagrammidae). Little is known about the distribution and abundance of Atka mackerel because it has only recently become the target of foreign fisheries and the U.S. surveys were not designed to estimate its abundance. Sablefish are found from California waters northward into the Gulf of Alaska and Bering Sea, but reaches its greatest abundance in the Gulf of Alaska.

Many of the flounders present in the Gulf of Alaska also occur in the Bering Sea and Washington-California region; however, the relative abundance of different species varies greatly between areas. In the Bering Sea yellowfin sole (*Limanda aspera*) dominates the flounder community, but is comparatively scarce in the Gulf and absent off Washington-California. Petrale sole (*Eopsetta jordani*) and English sole (*Parophrys vetulus*) are important components of the flounder community off Washington-California but they are scarce in the Gulf and for all practical purposes absent in the Bering Sea. The arrowtooth flounder, or so-called turbot (*Atheresthes stomias*), is widely distributed along the Pacific and Bering Sea coasts of the United States and appears to comprise the largest part of the exploitable biomass of flounders in the Gulf of Alaska. Other abundant flounders in the Gulf include Pacific halibut (*Hippoglossus stenolepis*), which reaches its greatest abundance there and off British Columbia; rock sole (*Lepidopsetta bilineata*); starry flounder (*Platichthys stellatus*); flathead sole (*Hippoglossoides*); rex sole (*Glyptocephalus zachirus*); and, in deep water, the Dover sole (*Microstomus pacificus*).

Along the slope of the Continental Shelf, rattails (*Macrouridae*) and idiot rockfish (*Sebastolobus*) are important components of the groundfish community.

Elasmobranchs are represented in the Gulf by several species of sharks and skates. The spiny dogfish shark (*Squalus acanthias*), is much less abundant in the Gulf than in waters off British Columbia and the Pacific Northwest where it is an important element within the groundfish community. Skates (*Rajidae*) are widely distributed throughout the Gulf and are most abundant on the inner shelf. Ratfish (*Hydrolagus collei*) are present in the Gulf but are much less abundant there than in waters to the south. The abundance of all elasmobranchs appears to decrease progressing from east to west in the Gulf toward the Alaska Peninsula.

3.2 History of exploitation.

The oldest fisheries in the Gulf of Alaska are the native subsistence fisheries for Pacific halibut, cod, herring, and other species. Catches were traded or sold to the Russians and later to the Americans after the purchase of Alaska by the United States in 1867. Groundfish and herring are still important sources of food to many groups of Alaskan natives, although these subsistence harvests are now dwarfed by commercial operations.

The first commercial groundfish fishery in the Gulf was a setline fishery for cod by U.S. nationals in 1867. Later U.S. fisheries developed on halibut, sablefish, and other groundfish. Canadians have been involved in groundfish fisheries in the Gulf since the beginning of this century and have directed most of their effort on halibut.

The Asian trawl fisheries on Gulf of Alaska groundfish began in 1962 when a Soviet fleet of 70 trawlers and support ships targeted on Pacific ocean perch, an abundant bottomfish of the outer continental shelf and upper slope. The next year Japanese fishing vessels of lesser numbers entered the Gulf and began directed fisheries on Pacific ocean perch and sablefish. The Asian trawl fisheries expanded rapidly in the 1960's. The combined effort of the Asian fisheries on Pacific ocean perch resulted in excessive annual catches of this species that ranged from 240,000 to 380,000 metric tons (mt) in 1964, 1965, and 1966. Annual catch peaked in 1965 and has since declined to about 48,000 mt in 1974. In addition to Pacific ocean perch, Asian trawl fisheries also target on pollock, sablefish, flounders, and Atka mackeral. The harvest of groundfish by Asian nationals greatly dwarfs that of the United States and Canada (Table 1).

3.2.1 Domestic fisheries.

U.S. nationals are involved in several types of groundfish fisheries: the North American halibut fishery, a sablefish setline and trap fishery, a bait fishery, and small fisheries for pollock, flounders, and rockfish. Total annual catches by U.S. fishermen are included in Table 1.

3.2.1.1 North American halibut fishery.

The commercial fishery for halibut began in coastal waters of Washington and British Columbia and expanded from there into the Gulf of Alaska after World War I. Both United States and Canadian nationals were involved in the fisheries, and in 1923 the United States and Canada ratified a halibut conservation treaty to regulate the fishery and to conduct research. The convention established the International Fisheries Commission, which was changed to the International Pacific Halibut Commission (IPHC) in 1953. Because of a combination of overfishing and environmental factors, the abundance of halibut declined and a new convention was signed in 1930 to broaden the Commission's regulatory powers for the rebuilding of the halibut stocks. Under scientific management, the halibut stocks were gradually rebuilt.

Table 1.—Groundfish catches (approximate) from the Gulf of Alaska, 1967-75.

Species	Country	1967	1968	1969	1970	1971	1972	1973	1974	1975 1/
		(1,000 metric tons)								
Rockfishes (primarily Pacific ocean perch)	U.S.	tr	tr	tr	tr	tr	tr	tr	tr	tr
	U.S.S.R.	66	45	19	2/	30	24	4	17	10
	Japan	54	56	55	45	49	53	54	41	34
	R.O.K.	0	0	0	0	0	0	2/	2/	2/
	Poland	0	0	0	0	0	0	2/	2/	2/
	Total	120	101	74	45	79	77	58	58	44
Pollock	U.S.	0	0	0	0	0	0	0	tr	tr
	U.S.S.R.	2/	2/	2/	2/	tr	20	30	31	38
	Japan	6	6	18	9	9	14	7	30	10
	R.O.K.	0	0	tr	0	0	1	1	2/	2/
	Poland	0	0	0	0	0	0	2/	2/	2/
	Total	6	6	18	9	9	35	38	61	48
Atka mackerel	U.S.	0	0	0	0	0	0	0	0	0
	U.S.S.R.	2/	2/	2/	2/	2/	2/	9	18	20
	Japan	0	0	0	0	0	0	0	0	0
	R.O.K.	0	0	0	0	0	0	0	0	0
	Poland	0	0	0	0	0	0	2/	tr	1
	Total	0	0	0	0	0	0	9	18	21
Sablefish	U.S.	tr	tr	tr	tr	tr	1	1	1	1
	U.S.S.R.	2/	2/	2/	2/	tr	1	1	tr	tr
	Japan	5	15	19	24	25	36	27	24	18
	R.O.K.	0	0	0	0	0	0	1	3	2
	Poland	0	0	0	0	0	0	2/	2/	2/
	Total	5	15	19	24	25	38	30	28	21
Flounder	U.S.	0	tr	tr	tr	tr	tr	tr	tr	tr
	U.S.S.R.	2/	2/	2/	2/	2/	2	1	2	3
	Japan	5	3	3	4	2	8	19	7	1
	R.O.K.	0	0	0	0	0	0	0	2/	2/
	Poland	0	0	0	0	0	0	2/	2/	tr
	Total	5	3	3	4	2	10	20	9	4
Halibut	U.S. 3/	19	17	20	20	16	14	11	7	9
	U.S.S.R.	2/	2/	2/	2/	2/	tr	tr	tr	tr
	Japan	0	0	0	0	0	0	0	0	0
	R.O.K.	0	0	0	0	0	0	0	0	0
	Poland	0	0	0	0	0	0	2/	2/	tr
	Total	19	17	20	20	16	14	11	7	9
Others (cod and unidentified fish)	U.S.	tr	tr	tr	tr	tr	tr	tr	tr	tr
	U.S.S.R.	11	14	1	9	1	22	6	10	9
	Japan	4	4	2	3	3	2	7	10	9
	R.O.K.	0	0	0	0	0	0	tr	tr	tr
	Poland	0	0	0	0	0	0	tr	tr	1
	Total	15	18	3	12	4	24	15	20	19
Total	U.S. 3/	19	17	20	20	16	15	12	8	10
	U.S.S.R.	77	59	20	9	31	69	53	78	79
	Japan	74	84	97	85	88	113	114	112	73
	R.O.K.	0	0	0	0	0	1	2	3	2
	Poland	0	0	0	0	0	0	tr	tr	1
	Total	170	160	137	114	135	198	181	201	166

1/ Japan's catch is for the months of January to October, 1975.
2/ Catch, if any, included under "other".
3/ Includes Canadian catch of halibut.
4/ Excluding discarded incidental catch.

In 1962 the landings from the Gulf of Alaska reached an all-time high of 24,000 mt (table 2). High annual catches continued until 1966 followed by a decline so that by 1974 only some 7,300 mt were landed.

The greatest proportion of halibut taken by United States and Canadian nationals in the northeast Pacific and eastern Bering Sea came from the Gulf of Alaska. During the period 1955-75, between 65 and 80 percent of the total halibut landed annually came from the Gulf of Alaska (table 2).

A combination of factors may have brought about the decrease in the abundance of halibut which began in the 1960's. The catch limits during the period of peak

production may have been set too high for the North American fishery. A reduction in the number of young fish being recruited to the fishery became evident in the mid-1960's and continued through 1975. The intensive foreign trawl fisheries in the Gulf of Alaska, active since 1962, have aggravated this decline since juvenile halibut are taken incidental to their target species.

TABLE 2.—*Catch of Pacific halibut by U.S. and Canadian vessels in the Gulf of Alaska (1955–75). Catch in metric tons (dressed weight).*

Year	Gulf of Alaska						
	United States		Canada		Total	Total[1]	
		Percent		*Percent*	*A*	*B*	*Percent*[2]
1955	13,078	75	4,255	25	17,333	26,091	66
1956	15,878	77	4,869	23	20,747	30,204	69
1957	14,415	75	4,877	25	19,292	27,656	70
1958	13,744	70	5,806	30	19,550	29,261	67
1959	15,554	69	6,921	31	22,475	32,298	70
1960	14,028	66	7,244	34	21,272	32,480	65
1961	15,260	69	6,845	31	22,105	31,422	70
1962	15,329	65	8,276	35	23,605	33,957	70
1963	12,720	60	8,648	40	21,368	32,313	66
1964	10,559	49	9,998	51	20,557	27,118	76
1965	12,433	55	10,092	45	22,525	25,656	70
1966	12,603	56	9,862	44	22,465	28,130	80
1967	12,215	63	7,063	37	19,278	25,048	77
1968	7,897	47	8,877	53	16,774	22,042	76
1969	10,478	53	9,436	47	19,914	26,433	75
1970	11,267	58	8,319	42	19,586	24,920	78
1971	9,100	56	7,058	44	16,158	21,162	76
1972	8,641	60	5,691	40	14,341	19,452	74
1973	7,519	68	3,573	32	11,092	14,397	77
1974	5,845	80	1,440	20	7,285	9,664	75
1975	6,811	76	2,173	24	8,984	12,526	72

[1]Northeast Pacific and east Bering Sea.
[2]Combined totals of cols. A and B.

3.2.1.1.1 Vessels and gear.

The halibut fleet is composed of vessels over five net tons licensed by the International Pacific Halibut Commission and those under that size do not require an IPHC license. The former have been the mainstay of the halibut fishery and consist mainly of schooners and the more versatile seine-type vessels that can be used for trawling and seining in other fisheries; most are less than 40 net tons (Table 3).

Many of the small unlicensed boats were originally built for the salmon gillnet fishery. These one or two person boats fish for halibut with a variety of hook and line gear. Although the small boat fleet far outnumbers the licensed halibut fleet (see table 3), they land less than 20 percent of the total halibut catch. Most of them fish for halibut for only a few weeks before the salmon season or take halibut incidentally while fishing for salmon.

Licensed vessels use a unit of setline gear called a "skate" which consists of a longline on which branchlines or gangions each with a hook are attached at regular intervals. Longlines are 300 fathoms in length and several of these are spliced end to end to form the groundline, which is set on the sea bottom with baited hooks. The gear is left on the bottom for periods from 4 to 30 hours (soaking time). Fishing usually is conducted at depths between 45 and 150 fathoms, but may take place as shallow as 15 fathoms or as deep as 300 fathoms.

TABLE 3.—*Number of licensed and unlicensed vessels by area and nationality, 1976 (from IPHC)*

Vessel category	Number of vessels						
	Area 2[1]		Area 3*[2]		Total		
	Canada	United States	Canada	United States	Canada	United States	Grand total
Unlicensed vessels:							
Trollers	1,103	1,177	0	68	1,103	1,245	2,348
Setliners	263	507	1	343	264	850	1,114
Total	1,366	1,684	1	411	1,367	2,095	3,462
Licensed vessels:							
5 to 19 tons**	266	127	6	127	272	254	526
20 to 39 tons	31	31	10	68	50	99	149
40 to 59 tons	2	3	8	15	10	18	28
60 plus tons	0	1	16	5	16	6	22
Total	299	161	40	215	348	377	725
Grand total	1,665	1,846	50	626	1,715	2,472	2,187

*Includes vessels that fished in both areas.
**Includes small vessels of unknown tonnage.
[1]Includes INPFC areas Shumagin, Chirikof, Kodiak, and Yakutat.
[2]Includes waters of southeastern Alaska south to California.

3.2.1.1.2 Catch and effort.

During the early years of the Gulf of Alaska fishery the catch of halibut by U.S. nationals dwarfed that of the Canadians. In 1929 the U.S. catch of 18,200 mt was the highest ever recorded from the Gulf of Alaska by U.S. nationals. From 1930 to 1945 the U.S. annual catch averaged 14,360 mt and that of the Canadians about 880 mt. After 1945 the Canadian catch gradually increased and by the 1960's and early 1970's between 37 and 53 percent of the total Gulf

of Alaska annual halibut catches were landed by Canadians. Their peak catch was about 10,100 mt in 1965. since 1973 their catch and contribution to the total have declined (table 2).

U.S. catches were relatively high during the years 1955 to 1962 but have gradually declined, reaching an all-time low of some 5,800 mt in 1974 (table 2).

The most productive period of the Gulf of Alaska halibut fishery was from 1956 to 1967 when the annual catches ranged from 19,300 to 23,600 mt. The catches in 1974 and 1975 were less than 9,000 mt.

3.2.1.2 Sablefish setline fishery.

The sablefish fishery began about 1906, and was relatively unimportant until about 1935 when the catch began to increase. The peak was reached in 1946 when slightly more than 2,800 mt were landed. Since then the catch has declined. Currently annual catches are less than 1,100 mt. The fishery is centered in the inside marine waters of southeastern Alaska where over 90 percent of the annual harvest occurs. It is an offseason fishery that is pursued mainly by Alaskan halibut fishermen after the close of the halibut season in the early fall. A few crab and salmon fishermen also switch over to sablefish in the fall. Recently, some vessels have been using traps for sablefish.

3.2.1.2.1 Vessels and gear.

In 1976, 159 vessels using longlines and six vessels using fish pots fished for sablefish with over 80 percent of the catch being taken by longline gear.

Technological advances are presently changing the fishery for sablefish. Within recent years Alaska fishermen have reduced the hook size and spacing substantially. To compensate for the resulting increased work load many fishermen are delivering much of the catch undressed in slush ice and are using automatic baiting machines, thereby increasing their efficiency and also reducing the crew size.

3.2.1.2.2 Catch and effort.

Since the inception of the Alaska sablefish fishery, demand has dictated catch level more than has stock size, with rapid increases in catch during the 1940's because of the expanded market for the vitamins from liver. Harvest levels gradualy decreased after 1945 mainly because of the declining market. However, catch per skate, derived from log book records from the early 1930's through 1960, also indicates a consistent downward trend. The data also indicates a marked decline in the average size of fish during this period. Landings and efforts during the late 1960's and early 1970's reached a record low primarily because of a movement of fishermen into other fisheries as a result of poor prices and depressed stock levels in favored fishing areas. Effort increased considerably in 1972 in conjunction with rising prices. In 1973 the State of Alaska instituted a quota of 1 million pounds (454 mt) for the northern districts of southeastern Alaska to stop the decline of stocks in those districts. During 1974, higher costs, relatively low prices, and poor stock condition all were instrumental in keeping the effort down. An analysis of the trends of the fishery indicates the quota area in northern southeast Alaska will continue to have a high number of landings relative to other areas. Although Alaskan sablefish fishermen have almost ceased fishing in the outside waters because of the extensive foreign effort, there is a potential for a large domestic sablefish fishery in these outside waters if meaningful restrictions are placed on the foreign effort.

3.2.1.3 Bait fishery.

The Gulf of Alaska bait fishery arose mainly in response to the need for bait in the growing crab fisheries of Alaska. The halibut fishery also required substantial amounts of groundfish for bait. The bait fishery occurs from Prince William Sound west to the Aleutians, but some two-thirds of the catch is landed in Kodiak. The catch consists largely of pollock, Pacific cod, and various flounder species.

3.2.1.3.1 Vessels and gear.

Goundfish for bait is taken primarily as a bycatch in the Kodiak shrimp fishery. There are also two to five trawlers in the Kodiak area which direct a substantial amount of effort towards catching groundfish for bait. Several shrimp fishermen have invested in groundfish gear in order to target on various bait species. This action appears to be initiating a trend among shrimp vessels of carrying trawls with large mesh web aboard so that concentrations of groundfish encountered in the shrimp grounds can be fished when bait prices are high.

3.2.1.3.2 Catch and effort.

Although the catch of groundfish for bait increased from 96 metric tons in 1972 to 303 mt in 1976, it now appears to be reaching its peak because of market saturation. However, the unrecorded catch for bait may be equal to or exceed the recorded catch. A large amount of cod (estimated to be about 1,000 mt) is caught and utilized on board by the Canadian and United States halibut boats. An additional amount is transferred by shrimp vessels to crab vessels on the fishing grounds. Crab vessels also trawl for bait.

3.2.1.4 Other domestic groundfish fisheries.

In 1976 a fishery for flounders and pollock started in southeastern Alaska. It centered in Petersburg where a fleet of three boats trawled for pollock during the winter and for flounders during the spring. Approximately 120 mt of flounders and 60 mt of pollock were landed in 1976. A new seine fishery for pollock also began in 1976 in which an additional 126 mt of pollock were caught. This seine fishery is a sideline activity for many of the salmon seiners in the Petersburg area. It now appears that there may be a shift from seining to trawling for pollock.

There is a small incidental catch of rockfish in the halibut and sablefish setline fisheries. In 1976 the catch reached about 128 mt of which 98 percent were taken in southeastern Alaska waters.

In addition an estimated 2,700 mt of small "waste fish," primarily capelin and juvenile pollock, are taken incidentally by the Alaska shrimp fishery.

3.2.2 Foreign fisheries.

3.2.2.1 Canada.

Canadians began fishing Alaskan waters around the turn of the century when they participated to a very limited extent in the former setline fishery for cod. It is not clear whether such participation occurred prior to 1900 during the early period of the cod fishery, but it is known that one or two Canadian operations for cod took place off Alaska about 1902 and 1913 (Forrester, et al., in press). Information on the extent and area of origin of these Canadian catches of cod is not available so it cannot be determined whether they were caught in the Gulf of Alaska or in the Bering Sea.

Canadian involvement in the North American setline fishery for halibut in the Gulf of Alaska dates back to the 1920's and has continued until present (see section 3.2.1.1).

Canadian vessels also take relatively small amount of other groundfish (sablefish, cod, lingcod, and rockfish) in the Gulf of Alaska, entirely from southeastern Alaska waters.

3.2.2.1.1 Vessels and gear.

Canadian fisheries on Pacific halibut are carried out by small longline vessels (see Section 3.2.1.1.1 on North American halibut setline fishery). Other groundfish are harvested by several kinds of small vessels.

3.2.2.1.2 Catch and effort trends.

The annual average Canadian harvest of groundfish from the Gulf of Alaska during the period 1963-1975 was reported as being 9,340 mt of halibut and 118 mt of other groundfishes. The annual Canadian harvest of halibut from the Gulf steadily increased from less than 5,000 mt prior to 1947 to a maximum of 10,000 mt in 1965. Since 1973 their annual catch has been less than 4,000 mt and has comprised between 20 and 32 percent of the total United States-Canadian halibut catch in the Gulf of the years 1973 through 1975.

3.2.2.2 U.S.S.R.

Soviet fishing vessels first appeared off Alaska in the eastern Bering Sea in 1959, and by 1962 Soviet trawling operations had expanded into the Gulf of Alaska. Their principal target species was Pacific ocean perch, but with the decline of these stocks in the late 1960's and early 1970's, the Soviet fisheries shifted to other less heavily exploited fish, such as pollock, Atka mackerel, and flounders. In contrast to Japan's fishery, which includes both trawls and longlines, all fishing by the U.S.S.R. in the Gulf of Alaska has been with trawls.

3.2.2.2.1 Vessels and gear.

The U.S.S.R., more than any other nation, has utilized the expeditionary or flotilla concept in its fishing operations off the Pacific and Bering Sea coasts of the United States. This involves the deployment of several kinds of vessels in support of its catcher fleet. In the Gulf of Alaska these support vessels have included factoryships for receiving and processing catches; refrigerator transports to replenish stores aboard the catcher vessels and to receive, freeze, and transport their catches to the homeland; oil tankers, tugs; partol vessels; passenger ships and research vessels. Refrigerator transports are the mainstay of the support operations and some are upward of 200 meters in length and 25,000 gross tons or more. A large refrigerator transport to store 25,000 gross tons has a hold capacity to store about 12,000 tons of frozen products, which is equivalent to the capacity loads of about 13 of the factory stern trawlers now in use—or six to eight of the new supertrawlers recently ordered into production.

Side trawlers and factory stern trawlers are the two kinds of catcher vessels which have been employed by the U.S.S.R. (Hitz, 1968). Side trawlers shoot and haul their nets over the side of the vessel and are smaller and less versatile than the factory trawlers which deploy their nets over the stern. Three classes of side trawlers have been used. Smallest and oldest of the side trawlers is the SRT class of 265–355 gross tons and a crew of 22 to 26. Next largest of the side trawlers is the SRTR class of refrigerated medium trawlers of 505–630 gross tons and a crew of 26–28. Largest of the refrigerated side trawlers is the SRTM class of around 700 gross tons with a crew of about 30. Side trawlers, particularly SRTM's, often operate independently by

processing and freezing their own catches; however, they also may offload their catches to factory ships for processing. Side trawlers are being phased out of Soviet operations off Alaska, only a few of the SRTM class have appeared in the last 2 years.

Factory stern trawlers are the largest of the catcher vessels used by the Soviets. They typically process and freeze their own catches. Because of their larger size and more efficient layout for handling the net over the stern, factory trawlers are capable of fishing under worse weather conditions than side trawlers. The most common factory stern trawler in use off the Pacific and Bering Sea coasts of the United States has been the so-called BMRT of 3,170 gross tons and a crew of about 90. In recent years a new class of factory stern trawler, the RTM, has come into use. It is of the same general size as a BMRT but has the advantage of a larger deck area aft for handling gear and fish. Several new classes of "supertrawlers" have been scheduled for serial production by the U.S.S.R. They will be from 4,000 to 5,500 gross tons, up to 7,000 horsepower, and will double the daily fish production and freezing capacity of the factory stern trawlers now in use.

A characteristic feature of the Soviet fishery is a greater reliance on support vessels than by Japan. This appears to be mainly because the catches are not processed to as great an extent aboard Soviet vessels as on Japanese vessels. The more highly processed Japanese products occupy less space aboard the catcher vessels, which means they do not have to unload as frequently as Soviet vessels; hence, there is less need for refrigerator transports.

Soviet officials have as of this writing informed the United States that they plan not to use side trawlers and factoryships in the northeastern Pacific in 1977.

3.2.2.2.2 Catch and effort trends.

The Soviet fishery in the Gulf of Alaska has been a classic example of pulse fishing in which massive fishing effort is generated on local stocks with an early buildup in catches, followed by declining yields as abundance quickly falls off, and a shift of effort to other species or grounds. This pattern of fishing was followed by the U.S.S.R. on Pacific ocean perch throughout its range in the Gulf, starting in the west around the Shumagin Islands and ending in the eastern area of southeastern Alaska. The Soviet fishery peaked early in the Gulf with total groundfish catches reaching an estimated level of over 200,000 metric tons in 1963 and over 300,000 tons in 1965, then falling to 83,000 tons in 1966 and to an all-time low of 9,000 tons in 1970. There has been some recovery in Soviet catches since 1970 to about 80,000 tons in 1974. This was accomplished, however, only by diverting the fleets from Pacific ocean perch, the target of the earlier fishery, to other less heavily exploited species of groundfish such as pollock, Atka macherel, and flounders.

The relative importance of the Soviet fishery for groundfish in the Gulf of Alaska compared to its fisheries in the Bering Sea and Washington-California area has diminished greatly with time. During the initial fishing period in 1962–65 when Pacific ocean perch were still present in large concentrations, the catch from the Gulf of Alaska comprised 60 percent of the total Soviet harvest of groundfish (excluding herring) from all Pacific waters off the United States and Canada. The comparable figure for the Gulf of Alaska during the period 1970–74 was less than 9 percent of the groundfish total. This great reduction in the relative importance of the Gulf of Alaska to the U.S.S.R. has occurred despite efforts by the Soviets to maintain their catches by diverting to other target species besides Pacific ocean perch.

It is impossible to quantitatively assess the improvement in the efficiency of Soviet fishing effort as a result of increased knowledge of the fish and fishing grounds and improvements in fishing gear, navigation, and fish-finding equipment. However, it is possible to examine changes that have occurred within the fleet regarding the numbers and gross tonnages of the different kinds of catcher vessels employed. This has been done in Table 4 for all waters off Alaska, but it is generally representative of what has occurred in the Gulf of Alaska.

TABLE 4.—*Number and equivalent gross registered tonnage of different Soviet catcher vessels sighted off Alaska, 1963–74. Sightings were by NMFS personnel and do not include repeated sightings of the same vessels. Observations were not extensive enough to provide comparative numbers in 1959–62 and unavailable for 1975.*

Year	Side trawlers					Factory stern trawlers			Equivalent gross tons all classes
	SRT	SRTR	SRTM	SRTK[1]	Total	BMRT	RTM	Total	
1963	155	7	.....	.....	162	10	1	11	79,000
1964	127	8	12	.....	258	28	1	29	187,000
1965	330	11	25	.....	366	36	3	39	233,000
1966	248	9	44	.....	301	42	4	46	345,000
1967	191	7	66	.....	264	53	4	57	279,000
1968	97	5	90	.....	192	71	3	74	326,000
1969	66	9	127	.....	202	78	6	85	377,000
1970	65	11	144	.....	220	97	6	103	447,000
1971	92	7	102	2	203	102	5	107	438,000
1972	111	6	161	7	285	100	11	111	497,000
1973	25	7	155	8	195	105	15	120	498,000
1974	28	7	174	8	214	117	14	131	546,000

[1]Medium stern trawler, approximately 750 gross tons.

A great increase in Soviet fishing power off Alaska is shown by the shift within the side trawler class from the use of small SRT's to large SRTM's and the increasing deployment of large factory stern trawlers. Factory stern trawlers now comprise over one-third of the Soviet catcher fleet off Alaska compared to only about 9 percent of the fleet in 1963–65. The gross tonnages for the combined classes of vessels are better measures of the fishing power than just the number of vessels. As can be seen from Table 4, the gross tonnage, and hence, relative fishing power of the Soviet fleet increased from an average level of 160,000 gross tons in 1963–65 to an average level of 514,000 gross tons in 1972–74.

3.2.2.3 Japan.

The earliest reported fishing by Japanese vessels off Alaska resulted from an order issued by the Secretary of Commerce in April 1918 which suspended the law forbidding the landing of catches by foreign vessels in U.S. ports. The suspension was to encourage the importation of fish in order to compensate for reduced food supplies caused by World War I and was terminated in July 1921. During the time the suspension was in effect, Japanese vessels landed 4.5 million dry-salted cod and 80 mt of stockfish (dried, unsalted cod) at San Francisco and Puget Sound ports (Cobb, 1927). Although most of this cod was from around the Kurile Islands and Ohkotsk Sea, in a few instances the Japanese vessels caught their fish off Alaska. Neither the amount nor the area of origin (Bering Sea or Gulf of Alaska) of catches off Alaska can be determined now.

The first significant effort by Japan in the Gulf of Alaska began in 1960 when several small trawlers were diverted there from the Bering Sea to carry out exploratory operations. Exploratory probes continued in the Gulf through 1962, and commercial operations by Japan commenced with the assignment of several large independent trawlers there in 1963 (Chitwood, 1969). To some degree the initiation by Japan of a full-scale fishery for groundfish in the Gulf of Alaska in 1963 was precipitated by the start of a fishery there by the U.S.S.R. in 1962. Japan had shown prior constraint in pursuing a fishery in the Gulf of Alaska, at least partly in consideration for the potential impact on halibut—a subject of discussions between the Governments of Japan, Canada and the United States. The fleet of Japanese trawlers and area of operations in the gulf were expanded rapidly after 1963.

Since its inception, the Japanese Gulf of Alaska trawl fishery (licensed by Japan as the North Pacific trawl fisheries) has targeted principally on Pacific ocean perch, although substantial amounts of other groundfish are taken. In some years and areas there are major directed fisheries on pollock.

In addition to their trawl fisheries, Japan has had a fishery for sablefish in the Gulf

since 1963. Although the sablefish fishery is licensed by Japan under the North Pacific Longline-Gillnet Fishery, gill nets (sunken types) were only used during 1963. Since then the Japanese have used longline and occasionally pot gear.

From the standpoint of size of catch as well as kind of fishing operations, Japan's fishery for groundfish is much less extensive in the Gulf of Alaska than in the Bering Sea. During the period 1970-74, Japan's harvest of groundfish from the Gulf of Alaska averaged only 99,000 mt compared to 1,706,000 mt from the Bering Sea. The Bering Sea harvest is taken by four kinds of fishing operations: a mothership fishery, North Pacific trawl fishery, landbased dragnet fishery, and North Pacific longline-gillnet fishery (See Preliminary Fishery Management Plan for Bering Sea Trawl Fisheries). In the Gulf of Alaska, Japan has only two kinds of fishing operations, a North Pacific trawl fishery and a sablefish setline fishery.

3.2.2.3.1 North Pacific trawl fishery.

3.2.2.3.1 Vessels and gear.

The North Pacific trawl fishery is now entirely carried out by factory stern trawlers operating independently of motherships and either offloading their processed catches to refrigerator transports or delivering the catches to Japan themselves. This is in contrast to the earliest period of the fishery when some side trawlers were employed as well as vessels which served as motherships to receive and process the catches. Since 1967 Japan has limited by license to 42 the number of vessels that can participate at any one time in the North Pacific trawl fishery; they may fish in waters north of 10°N latitude and east of 170°E longitude. This fishing area includes the Bering Sea, Aleutian Islands, Gulf of Alaska, and waters to the south off Canada and the remainder of the United States. However, most of the catch by the North Pacific trawl fishery is from the Bering Sea. For example, in 1970-74, the average annual catch by this fishery was 484,000 mt from the Bering Sea and Aleutian Island region compared to 77,000 mt from the Gulf of Alaska.

3.2.2.3.1.2 Catch and effort trends.

The annual groundfish catch in Japan's Gulf of Alaska trawl fishery rose rapidly and by 1966 was approximately 85,000 mt. Between 1966 and 1974 the catch has averaged some 79,000 mt. Peak catches of 91,000 and 92,000 mt were made in 1973 and 1974. Preliminary statistics for 1975 indicate that the total catch will be less than 65,000 metric tons.

Pacific ocean perch has been the principal component of the annual groundfish catches. The maximum catch of this species (65,200 mt) occurred in 1966, but since then the annual catch has gradually declined, reaching a figure of 36,900 mt in 1974 and less than this in 1975. Since 1968 most of the Japanese ocean perch catch has been obtained from the INPFC areas of Kodiak, Yakutat, and Southeastern.

A significant feature of Japan's operations in the Gulf of Alaska has been the increase in fishing efficiency over the years. Some of the increase is a natural consequence of the fishermen learning more about the distribution and abundance of the fish and thereby being better able to anticipate where and when to find them in fishable concentrations. There also has been a major upgrading in efficiency of the fishing fleet, in terms of vessel size, horsepower, efficiency of fishing gear, navigation equipment, and fish-finding devices. Between 1967 and 1975 the average size of factory trawlers employed in the North Pacific trawl fishery increased from about 1,500 gross tons to over 2,500 tons. The result of this upgrading has been a marked increase in the fishing power of the fleet which is not apparent when one considers just the number of vessels employed.

3.2.2.3.2 Sablefish setline fishery.

3.2.2.3.2.1 Vessels and gear.

Vessels employed in Japan's sablefish fishery in the Gulf of Alaska now use longlines, and sometimes traps. In 1963, bottom gillnets were used, but this method of fishing was soon discontinued. The average size of vessels in the sablefish fishery has increased from about 350 to almost 500 gross tons.

3.2.2.3.2.2 Catch and effort tends.

According to estimates by NMFS law enforcement personnel, the annual average catch of sablefish by Japanese longline vessels in the Gulf during the years 1964-67 was about 2,700 mt.[1] During the subsequent period, 1968-74, the annual average catch of sablefish by this fleet was 18,788 mt. The annual average longline catch of sablefish by Japan in INPFC Area Southeastern during 1968-74 was 6,843 mt, or a little more than one-third of Japan's total longline catch from the Gulf. The relatively large catches taken off southeastern Alaska are particularly significant since that is the primary site for the U.S. sablefish fishery.

3.2.2.4 Republic of Korea (ROK).

ROK vessels first began fishing for groundfish in the Gulf of Alaska in 1972, some five years after their Bering Sea operations had begun. They target on sablefish using setline gear, although a small amount of trawling for the species took place in 1976.

3.2.2.4.1 Vessels and gear.

ROK vessels use longline gear similar to that of Japanese longliners for capturing sablefish.

3.2.2.4.2 Catch and effort trends.

The year 1975 was the first for which ROK provided fishery statistics on their Gulf of Alaska operations. From surveillance of their fisheries, NMFS law enforcement personnel have estimated their catches of sablefish as 1,300 mt in 1972, 1,700 mt in 1973, and 2,800 mt in 1974. For 1975, ROK reports a sablefish catch of almost 2,200 mt of which 50 percent were obtained from the Southeastern Area. ROK has announced a catch target of 18,000 mt of sablefish in 1976, of which perhaps one-half is planned to be taken from the Gulf of Alaska and the other half from the Washington-California area.

3.2.2.5 Poland.

Polish vessels carried out exploratory fishing probes into the Gulf of Alaska in 1973 and conducted small fisheries on groundfish in 1974 and 1975. The reported catches were less than 100 mt in 1974 and about 2,000 mt in 1975; the catches were mostly pollock, Atka mackerel, and rockfish.

3.2.2.5.1 Vessels and gear.

Poland uses only factory stern trawlers for catcher vessels and its fishing operation is closely patterned after that of the U.S.S.R. Polish shipyards are among the major suppliers of vessels for the worldwide Soviet fishing fleet; the technology so gained has been put to good use by Poland in developing its own distant-water fisheries off the United States and in other parts of the world.

3.2.2.5.2 Catch and effort trends. (See Section 3.2.5.)

3.2.2.6 Other nations.

A Taiwanese longliner began fishing in the Gulf in 1975 and was soon apprehended for violating the U.S. contiguous fishing zone. As of July 1976, three Taiwanese longliners and one factory stern trawler had been observed fishing in the Gulf.

3.3 History of management.

The earliest restrictions on the taking of groundfish from the Gulf of Alaska were those arising from the Halibut Conservation Treaty ratified by the U.S. and Canada in 1923. The Treaty set up the International Fisheries Commission (renamed the International Pacific Halibut Commission in 1953) to recommend measures to regulate the halibut fishery and to conduct research.

The U.S. Bureau of Commercial Fisheries, the predecessor of the current U.S. National Marine Fisheries Service, was responsible for both research and management of domestic fisheries in Alaska before statehood in 1958. The BCF imposed restrictions on the size, character, and operation of trawls used to capture groundfish and established a seasonal closure on sablefish in southeastern Alaskan waters. In 1959 the State of Alaska assumed responsibility for regulating the groundfish fisheries of Alaska. A history of the State's groundfish regulations is given in Table 5.

Until 1966, restrictions on foreign fishing pertained to U.S. territorial waters which extended three miles from shore. In 1966 a 12-mile contiguous fishing zone (CFZ) was established which prohibited foreign fishing and support thereof in this zone. Later, other restrictions (quotas, prohibition on fishing for certain species, and time and area closures) were imposed through bilateral agreements between the U.S. and foreign countries.

[1] Since Japan did not require licenses for the Gulf of Alaska sablefish fishery until 1968, no official record of catch for the period 1964-67 is available.

TABLE 5.—*Historical summary of Alaska groundfish regulations*

Year [1]	Seasons and quotas	Legal gear, definitions, and other regulations
1940	No closed season	Use of trawls prohibited except for shrimp, flounders when not capturing, injuring, or destroying other food fish, and spider and King crab west of 150° W. longitued exclusive of Cook Inlet.
1942		Trawls prohibited in fishing for salmon, herring, and Dungeness crab.
1945	Sablefish season within southeast Alaska closed Dec. 1 to Mar. 15, both dates inclusive.	
1948		Gear restrictions: Trawls. The size, character, and opeartion of otter trawls in Alaskan waters are limited as follows:

TABLE 5.—*Historical summary of Alaska groundfish regulations*—Continued

Year[1]	Seasons and quotas	Legal gear, definitions, and other regulations
1948		(a) Otter trawls having mesh smaller than 5 in stretched measure between knots in the bag and 6 in stretched measured between knots in the wings are prohibited: Provided, that otter trawls now in use having mesh smaller than that specified may be used through the calendar year 1949 if registered with the regional director, Fish and Wildlife Service, Juneau, Alaska. (b) The use of any devices attached to the footrope or elsewhere, such as chain ticklers, which may cause undue disturbance or destruction of the bottom, is prohibited. (c) The use of otter trawls in any area which the International Fisheries Commission has found to be populated by small immature halibut and accordingly has closed to all halibut fishing, is prohibited. (d) All operators of otter trawls shall maintain a running log on forms furnished showing date, type, and size of mesh of trawl used, each locality fished, the time and duration of each 2, and the estimated poundage and number or average weight of each species caught. Such logs shall be available for inspection by representatives of the Fish and Wildlife Service at any reasonable time, and the duplicate sheets shall be transmitted to the Fish and Wildlife Service at periodic intervals. On or before Dec. 15 of each year complete statistics of operation shall be submitted to the Fish and Wildlife Service on forms provided for the purpose. (e) The use of any trawl in commercial fishing for salmon, herring, and Dungeness crabs is prohibited.
1949		The following species besides salmon were defined as commercial fish: Albacore (*Germo alalunga*) tuna. Cod (*Gadus macrocephalus*) codfish, true cod, and grey cod. Eulachon (*Thaleichthys pacificus*) smolt and hooligan. Halibut (*Hippoglossus astenolepis*). Herring (*Clupea pallasii*). Lingcod (*Ophiodon elongatus*). Rockfish (all species of genus *Sebastodes* also known as rockcod and sea bass). Sablefish (*Anoplopoma fimbria*) black cod. Sheefish (*Stenodus mackenzii*) inconnu. Sole and flounder (all species of family *Pleuronectidae*).
1958		Trawl fishermen no longer required to fill out logbooks.
1959 and 1960		Alaska statehood. Trawls illegal for taking crab. Longlines and trawls may be used to take groundfish. Longlines are the only legal gear with which to take sablefish within southeast Alaska. Halibut are to be regulated according to IPHC regulations 5AAC 39.390.
1961		All defined legal gear became legal for the taking of groundfish excepting southeast sablefish.
1962	Southeast sablefish changed: Icy Street, eastern and western districts, Aug. 15 to Oct. 15; all other districts May 1 to Nov. 30.	
1963	Southeast sablefish districts 9 to 15, Aug. 15 to Oct. 15; all others May 1 to Nov. 30.	
1967		Southeast sablefish: A 2½ in. No. 20 thread or less gillnet may be aboard vessel for taking bait.
1968		Southeast: sablefish taken incidentially by longline or otter trawl may be retained in an amount not to exceed 10 pct, by weight, of each landing.
1970	Southeast sablefish changed: Districts 9 to 15, Sept. 15 to Nov. 15 (1 mo. later).	Pots became legal sablefish gear within southeast.
1972	Southeast sablefish changed: Districts 9 to 15, Sept. 1 to Nov. 15; all other districts (1 to 8), Apr. 1 to Dec. 30 (more liberal).	Incidental allowable catch of sablefish increased to 20 pct. 1962 regulation (5 AAC 39.390) referring to IPHC management of halibut repealed.
1973	For southeast districts 9–15 a 1,000,000 lb. sablefish quota was enacted, with the season to close when quota is attained or by season ending date, whichever is earlier..	
1976	Southeast sablefish restricted in southern districts (1 to 8) June 15 to Nov. 15.	An untreated cotton escape for sablefish pots required within southeast. Also under general provisions, groundfish fishery, gear for groundfish.—(a) Groundfish may be taken by trawls, hand troll gear, seines, longlines, and pots except as legal gear may be further restricted by groundfish gear regulations of chs. 3 to 39 of this title and except as follows: (1) King and tanner crab pots as defined in chs. 34 and 35 of this title may not be used to take groundfish in the areas where the regulations define those pots; (2) Groundfish taken by power gurdy troll gear being fished for salmon consistent with applicable State laws and regulations are legally taken and possessed; and (3) All commercial longlines or skate gear buoys or kegs shall be marked with the permanent department registration number of the vessel fishing the gear.

TABLE 5.—*Historical summary of Alaska groundfish regulations*—Continued

Year[1]	Seasons and quotas	Legal gear, definitions, and other regulations
1976	Crab pots are not defined for all areas.	The most restrictive definitions are as follows: A king crab pot is a pot with rigid tunnel eye openings and which individually are a minimum of 5 in in 1 dimension, and tunnel eye opening perimeters which individually are larger than 30 in. A tanner crab pot is a pot with rigid tunnel eye openings which individually are a maximum of 5 in in 1 dimension, and tunnel eye opening perimeters which individually are larger than 30 in; or a pot which tapers from its base to a top consisting of 1 horizontal opening or undescribed size.
1977	Same as 1976 except season in all outside districts were open year around..	Same as 1976 except that sunken or diving gillnets may be used for groundfish upon issuance of a permit by the Commissioner (A.D.F. & G.).

[1]Earlier records not available.

3.3.1. Domestic fisheries.

3.3.1.1 Regulatory measures.

Fishery restrictions on U.S. nationals are those established by the State of Alaska and those promulgated by the International Pacific Halibut Commission (IPHC) for the taking of Pacific halibut. The State of Alaska requires all commercial fishermen landing any species of fish or shellfish in Alaska to possess a commercial fishing license, and the captain or owner of all fishing vessels are required to license their vessels and the fishing gear employed. Buyers are required to keep records of each purchase and show the number and name of the vessel, the State license number of the vessel, date of landing, pounds purchased of each species, statistical area in which the fish were caught, and the kind of gear used in taking the fish. Regulations pertaining specifically to groundfish include some exclusions of the use of purse seines and traps in some districts of certain areas within the Gulf of Alaska at certain times of the year. The most substantive regulations on groundfish fishing in the Gulf of Alaska are for sablefish in the Southeastern Area, where: (1) A catch quota of 1,000,000 pounds (454 mt) is permitted between September 1 and November 15 in districts 9 through 15, and (2) fishing is permitted with no quota on catch between June 15 and November 15 in districts 1 through 8.

Restrictions by the IPHC on the taking of Pacific halibut pertain to licenses, gear, size limits, seasons, and catch quotas. Licenses issued by the IPHC are required for all vessels fishing for halibut, except those less than 5 net tons, or vessels which use hook and line gear other than setlines. As regards both commercial and port gear, only hook and line gear is authorized by the IPHC for the taking of halibut.

3.3.1.2 Purpose of regulatory measures.

The limited number of groundfish regulations (Table 5) currently in effect by the State of Alaska, excepting the southeast Alaska sablefish regulations, were primarily designed for the protection of other fish (salmon, herring, juvenile halibut) and shellfish species, e.g., the pot gear definitions and gill netting, otter trawling, and seining restrictions.

The present 1,000,000 pound (454 mt) sablefish quota which applies to the northern, inside districts of Southeastern was established upon request of the fishermen in an attempt to reduce the decline of the inshore sablefish stocks. Since abundance and fishing mortality data were not available for inside waters, historical catch data were examined; and the quot was set as a temporary conservation measure. For the most part, gear and season restrictions for the sablefish fishery are based on economic and social considerations. Most sablefish fishermen are engaged in other fisheries during the summer. Therefore, the season in the traditional, northern grounds is delayed until September. Furthermore, the flesh quality is superior in the fall after the fish have recovered from spawning during the spring. For the closing date it was the concensus of opinion that if the sablefish quota could not be taken by November 1 the season should close. The deteriorating weather conditions during the fall also had influence on this decision.

Regulations by IPHC are designed to rebuild the halibut stocks to levels which will produce the maximum sustained yield.

3.3.2 Foreign fisheries.

3.3.2.1 Regulatory measures.

The two kinds of restrictions placed on foreign nations have been:

1. U.S. law establishing a 12-mile contiguous fishing zone (CFZ) within which all

foreign fishing and activities in support of fishing are prohibited. This law was approved on October 14, 1966. Enforcement of the CFZ and territorial waters is accepted by other fishing nations as a U.S. right and responsibility.

2. Provisions contained in bilateral and other agreements signed by foreign nations with the United States. These provisions usually have been agreed upon through a negotiating process in which concessions have been made by foreign governments to U.S. fishery interests in exchange for concessions granted by the United States to the fishery interests of the other nations. Concessions granted by the United States have been in the nature of permission to fish or carry out activities in support of fishing at certain times and places within the CFZ. Concessions granted by foreign nations have been in the form of agreement not to fish at certain times and places on the high seas outside the CFZ, not to target on certain species, and not to exceed certain levels of catch (catch quotas).

Enforcement of the provisions of bilateral and other agreements has been the responsibility of the individual nations. For example, the U.S.S.R. has been responsible for enforcing and imposing penalties on its own nationals for violations relating to fishing activities on the high seas, outside the U.S. CFZ.

Several restrictions on foreign nations in the form of catch quotas and area-time closures have been in effect in the Gulf of Alaska in recent years. Annual catch quotas for 1973-76 are shown for Japan in Table 6 and for the U.S.S.R. in Table 7, according to INPFC area or, when applicable, to the Northeast Pacific Region which includes from the Gulf of Alaska south to California.

In 1976 Poland was limited to no more than four fishing vessels in the Gulf of Alaska. In addition, Poland agreed not to conduct specialized fisheries in 1976 for rockfish, sablefish, flatfish, anchovies, Pacific mackerel, herring, or shrimp.

Since 1972 ROK has agreed not to fish for halibut in the Northeast Pacific Region. There are no restrictions on the groundfish fisheries of ROK.

TABLE 6.—*Limitation on catches (metric tons) of groundfish by Japan*

Area	Species	1973-74	1975-76
Northeast Pacific region	Groundfish other than rockfishes and sablefish.	[1]N.A.	30,000
Do	Rockfishes (including Pacific ocean perch).	N.A.	60,000
Do	Pacific ocean perch	60,000	N.A.
Northeast Pacific region:			
Trawl	Sablefish	N.A.	5,000
Longline	....do	[2]25,000	25,000
Northeast Pacific region	Halibut	[illegible]	[illegible]

[1]Not applicable.
[2]1971 level.

TABLE 7.—*Limitations on catches (metric tons) of groundfish by the U.S.S.R.*

Area	Species	1973-74	1975-76
Northeast Pacific region	Pacific hake	150,000	150,000
Shumagin southeastern region	Rockfishes (including Pacific ocean perch.	[1]N.A.	10,000
Do	Pollock	N.A.	40,000
Do	Groundfish other than rockfishes and pollock.	N.A.	30,000

[1]Not applicable.

No official fisheries agreements have been signed with Taiwan.

Area-time closures and other restrictions pertaining to the fisheries of Japan, U.S.S.R., Poland, and ROK are shown in figures 2 through 6.

Current regulations pertaining to the foreign fisheries are found in section 2.4 of the Preliminary Fishery Management Plan for the Groundfish Fisheries of the Gulf of Alaska and include catch limitations, prohibition on the retention of certain species of importance to the U.S., and time-area closures to prevent gear conflicts and provide protection to halibut.

Species	Japan	U.S.S.R.	ROK	ROC	Poland	Total
Pollock	44.1	63.1	35.8		6.0	149.0
Pacific ocean perch	19.8	8.7	.5			29.0
Other rockfish	2.7	1.2	.1			4.0
Flounders	18.7	1.8				20.5
Sablefish	13.9		1.6			15.5
Atka mackerel		21.0			1.0	22.0
Other species	5.8	12.4	.0		.2	18.5
Total	105.0	108.2	38.1	.0	7.2	258.5

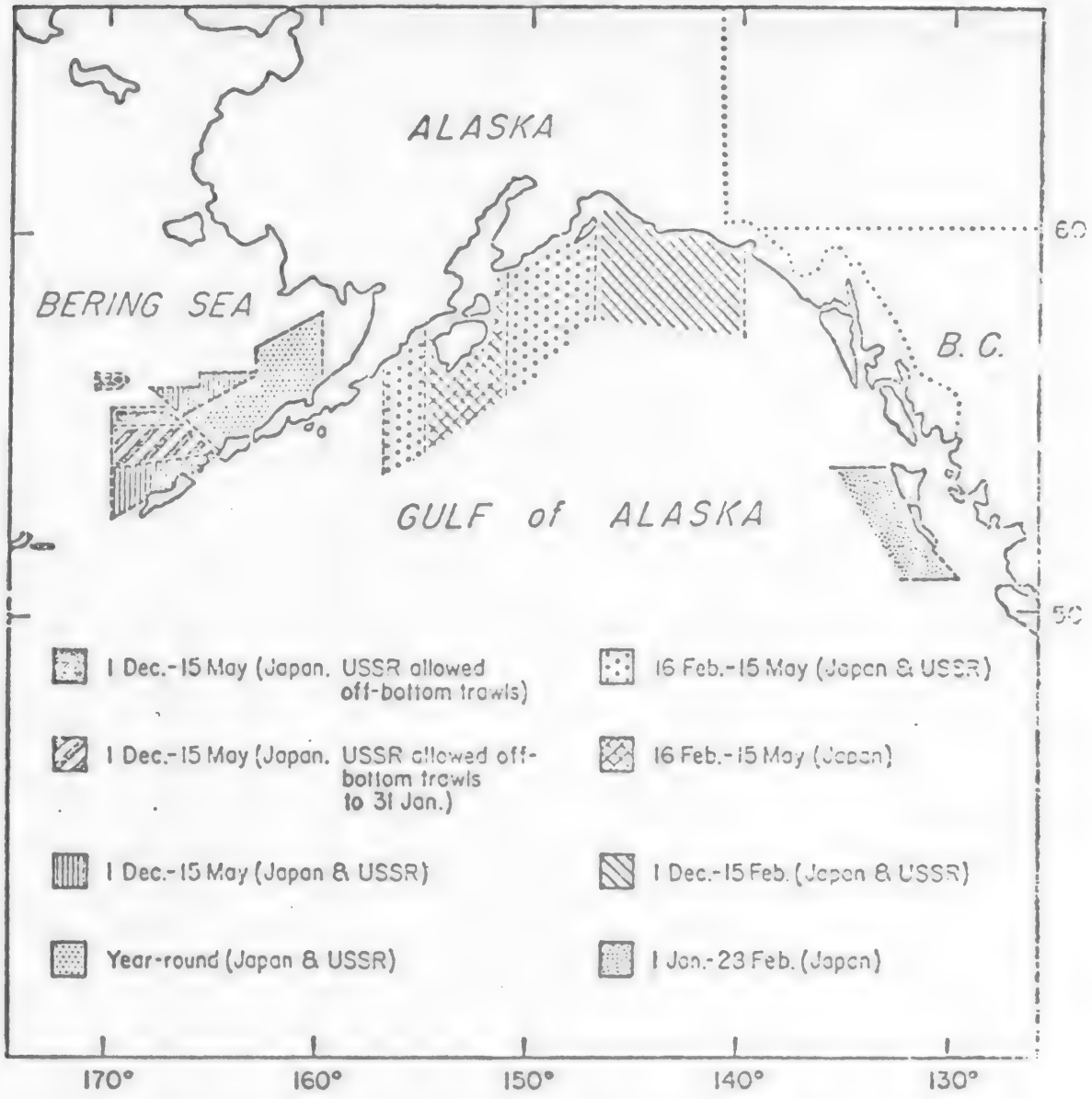


Figure 2.--Trawl closures for Japan and U.S.S.R. pertaining to halibut in the Bering Sea and Gulf of Alaska, 1975-76.

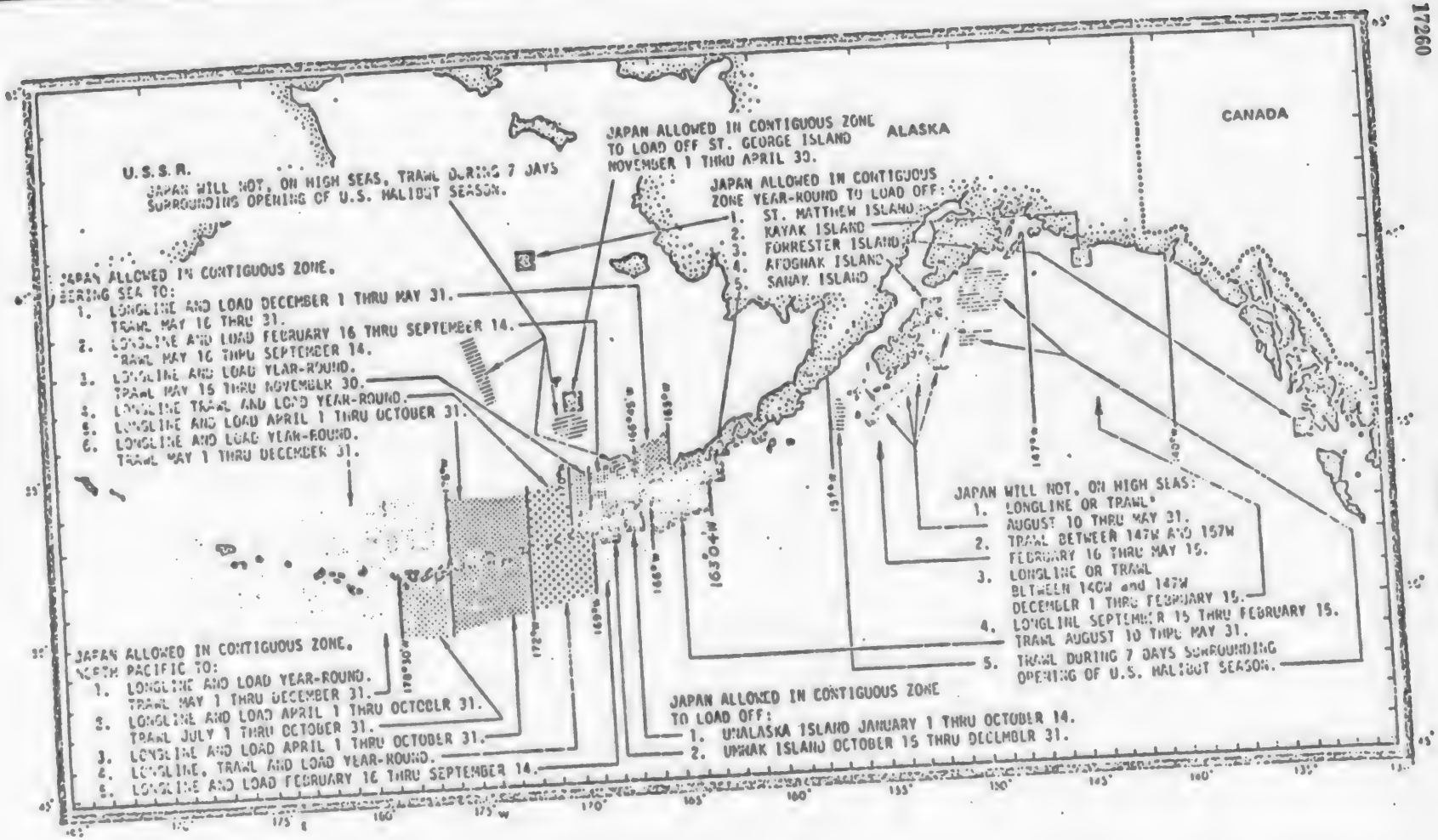

U.S.S.R.
JAPAN WILL NOT, ON HIGH SEAS, TRAWL DURING 7 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
JAPAN ALLOWED IN CONTIGUOUS ZONE.
BERING SEA TO:
1. LONGLINE AND LOAD DECEMBER 1 THRU MAY 31.
TRAWL MAY 16 THRU 31.
2. LONGLINE AND LOAD FEBRUARY 16 THRU SEPTEMBER 14.
TRAWL MAY 16 THRU SEPTEMBER 14.
3. LONGLINE AND LOAD YEAR-ROUND.
TRAWL MAY 15 THRU NOVEMBER 30.
4. LONGLINE TRAWL AND LOAD YEAR-ROUND.
5. LONGLINE AND LOAD APRIL 1 THRU OCTOBER 31.
6. LONGLINE AND LOAD YEAR-ROUND.
TRAWL MAY 1 THRU DECEMBER 31.
JAPAN ALLOWED IN CONTIGUOUS ZONE.
NORTH PACIFIC TO:
1. LONGLINE AND LOAD YEAR-ROUND.
TRAWL MAY 1 THRU DECEMBER 31.
2. LONGLINE AND LOAD APRIL 1 THRU OCTOBER 31.
TRAWL JULY 1 THRU OCTOBER 31.
3. LONGLINE AND LOAD APRIL 1 THRU OCTOBER 31.
4. LONGLINE, TRAWL AND LOAD YEAR-ROUND.
5. LONGLINE AND LOAD FEBRUARY 16 THRU SEPTEMBER 14.
JAPAN ALLOWED IN CONTIGUOUS ZONE TO LOAD OFF ST. GEORGE ISLAND NOVEMBER 1 THRU APRIL 30.
ALASKA
CANADA
JAPAN ALLOWED IN CONTIGUOUS ZONE YEAR-ROUND TO LOAD OFF:
1. ST. MATTHEW ISLAND
2. KAYAK ISLAND
3. FORRESTER ISLAND
4. AFOGNAK ISLAND
5. SANAK ISLAND
JAPAN WILL NOT, ON HIGH SEAS:
1. LONGLINE OR TRAWL
AUGUST 10 THRU MAY 31.
2. TRAWL BETWEEN 147W AND 157W
FEBRUARY 16 THRU MAY 15.
3. LONGLINE OR TRAWL
BETWEEN 140W and 147W
DECEMBER 1 THRU FEBRUARY 15.
4. LONGLINE SEPTEMBER 15 THRU FEBRUARY 15.
TRAWL AUGUST 10 THRU MAY 31.
5. TRAWL DURING 7 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
JAPAN ALLOWED IN CONTIGUOUS ZONE TO LOAD OFF:
1. UNALASKA ISLAND JANUARY 1 THRU OCTOBER 14.
2. UMNAK ISLAND OCTOBER 15 THRU DECEMBER 31.
163°04'W
65°
55°
45°
160°
175°W
170°
165°
160°
155°
150°
145°
140°
135°

Figure 3.--Area-time closures and restrictions for Japanese trawl and longline fisheries in the Gulf of Alaska, effective through December 31, 1976.

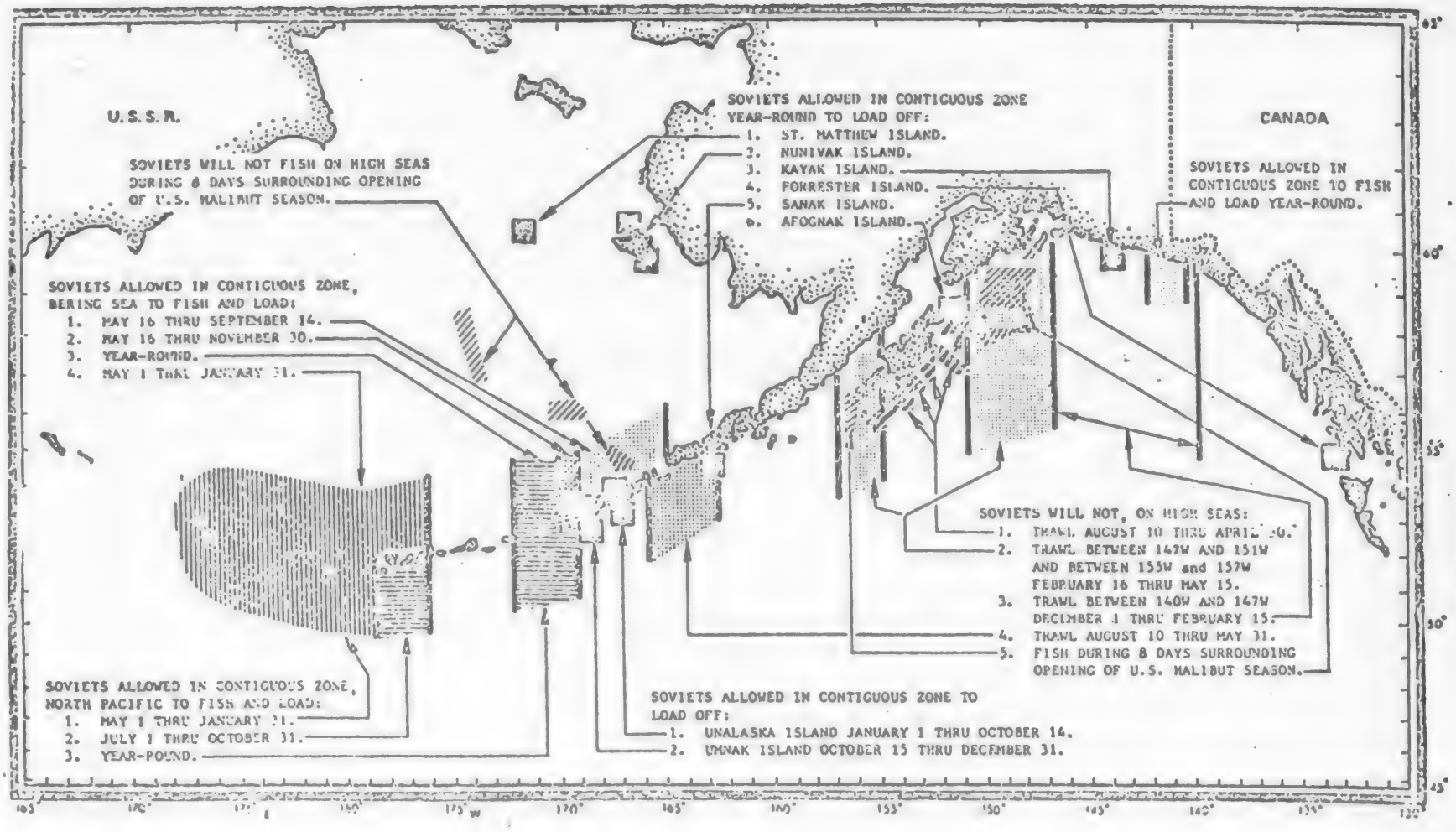

U.S.S.R.
SOVIETS WILL NOT FISH ON HIGH SEAS DURING 8 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
SOVIETS ALLOWED IN CONTIGUOUS ZONE, BERING SEA TO FISH AND LOAD:
1. MAY 16 THRU SEPTEMBER 14.
2. MAY 16 THRU NOVEMBER 30.
3. YEAR-ROUND.
4. MAY 1 THRU JANUARY 31.
SOVIETS ALLOWED IN CONTIGUOUS ZONE, NORTH PACIFIC TO FISH AND LOAD:
1. MAY 1 THRU JANUARY 31.
2. JULY 1 THRU OCTOBER 31.
3. YEAR-ROUND.
SOVIETS ALLOWED IN CONTIGUOUS ZONE YEAR-ROUND TO LOAD OFF:
1. ST. MATTHEW ISLAND.
2. NUNIVAK ISLAND.
3. KAYAK ISLAND.
4. FORRESTER ISLAND.
5. SANAK ISLAND.
6. AFOGNAK ISLAND.
CANADA
SOVIETS ALLOWED IN CONTIGUOUS ZONE TO FISH AND LOAD YEAR-ROUND.
SOVIETS WILL NOT, ON HIGH SEAS:
1. TRAWL AUGUST 10 THRU APRIL 30.
2. TRAWL BETWEEN 147W AND 151W AND BETWEEN 155W and 157W FEBRUARY 16 THRU MAY 15.
3. TRAWL BETWEEN 140W AND 147W DECEMBER 1 THRU FEBRUARY 15.
4. TRAWL AUGUST 10 THRU MAY 31.
5. FISH DURING 8 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
SOVIETS ALLOWED IN CONTIGUOUS ZONE TO LOAD OFF:
1. UNALASKA ISLAND JANUARY 1 THRU OCTOBER 14.
2. UMNAK ISLAND OCTOBER 15 THRU DECEMBER 31.
65°
60°
55°
50°
45°
165°
160°
155°
150°
145°
140°
135°
130°

Figure 4.--Area-time closures and restrictions for Soviet trawl fisheries in the Gulf of Alaska, effective through December 31, 1976.

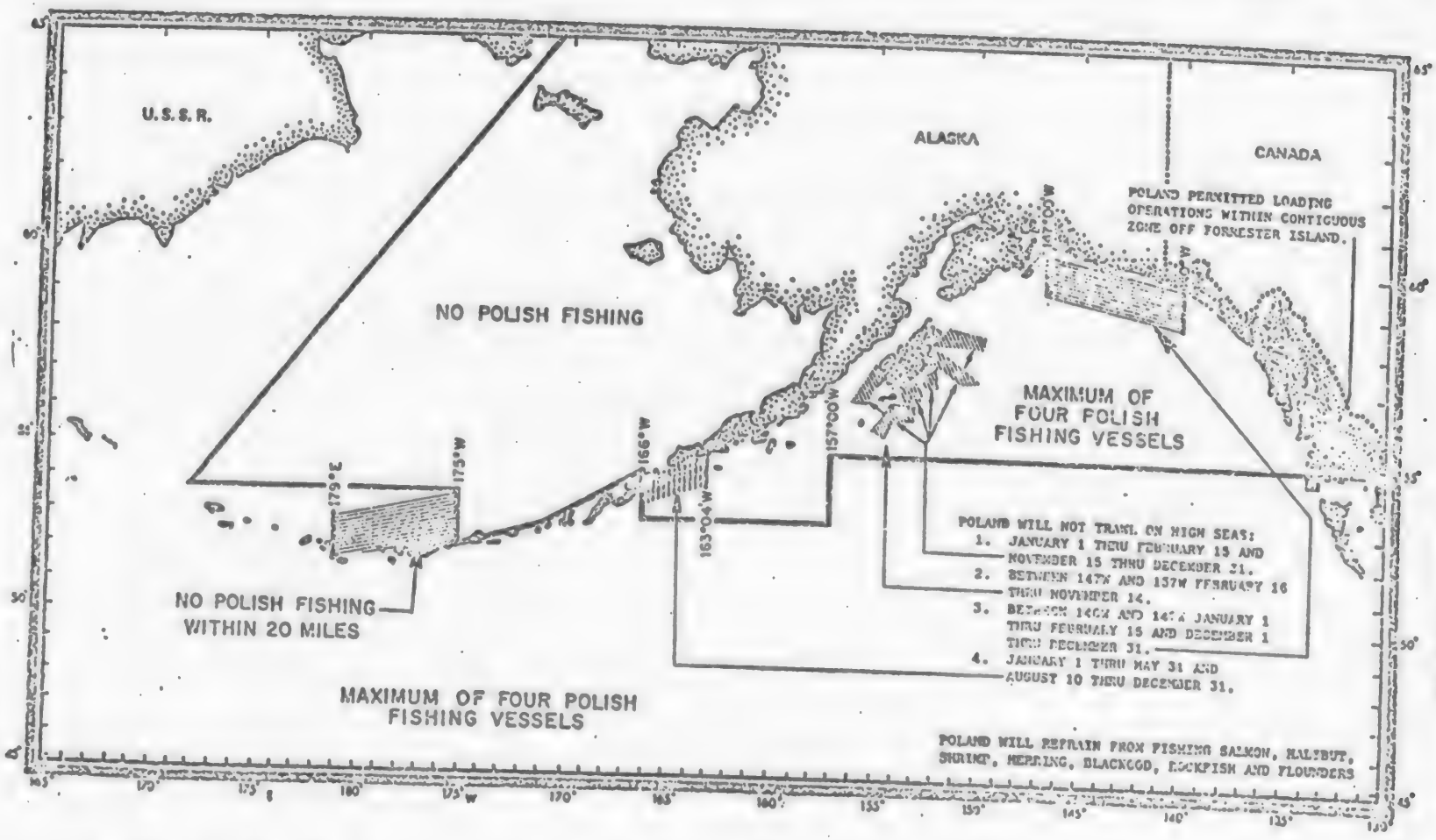

U.S.S.R.
ALASKA
CANADA
POLAND PERMITTED LOADING OPERATIONS WITHIN CONTIGUOUS ZONE OFF FORRESTER ISLAND.
NO POLISH FISHING
MAXIMUM OF FOUR POLISH FISHING VESSELS
179°E
175°W
166°W
163°04'W
157°00'W
NO POLISH FISHING WITHIN 20 MILES
POLAND WILL NOT TRAWL ON HIGH SEAS:
1. JANUARY 1 THRU FEBRUARY 15 AND NOVEMBER 15 THRU DECEMBER 31.
2. BETWEEN 147W AND 137W FEBRUARY 16 THRU NOVEMBER 14.
3. BETWEEN 140W AND 147W JANUARY 1 THRU FEBRUARY 15 AND DECEMBER 1 THRU DECEMBER 31.
4. JANUARY 1 THRU MAY 31 AND AUGUST 10 THRU DECEMBER 31.
MAXIMUM OF FOUR POLISH FISHING VESSELS
POLAND WILL REFRAIN FROM FISHING SALMON, HALIBUT, SHRIMP, HERRING, BLACKCOD, ROCKFISH AND FLOUNDERS

Figure 5.--Area-time closures and restrictions for fisheries of the Polish People's Republic in the Gulf of Alaska, effective through December 31, 1976.

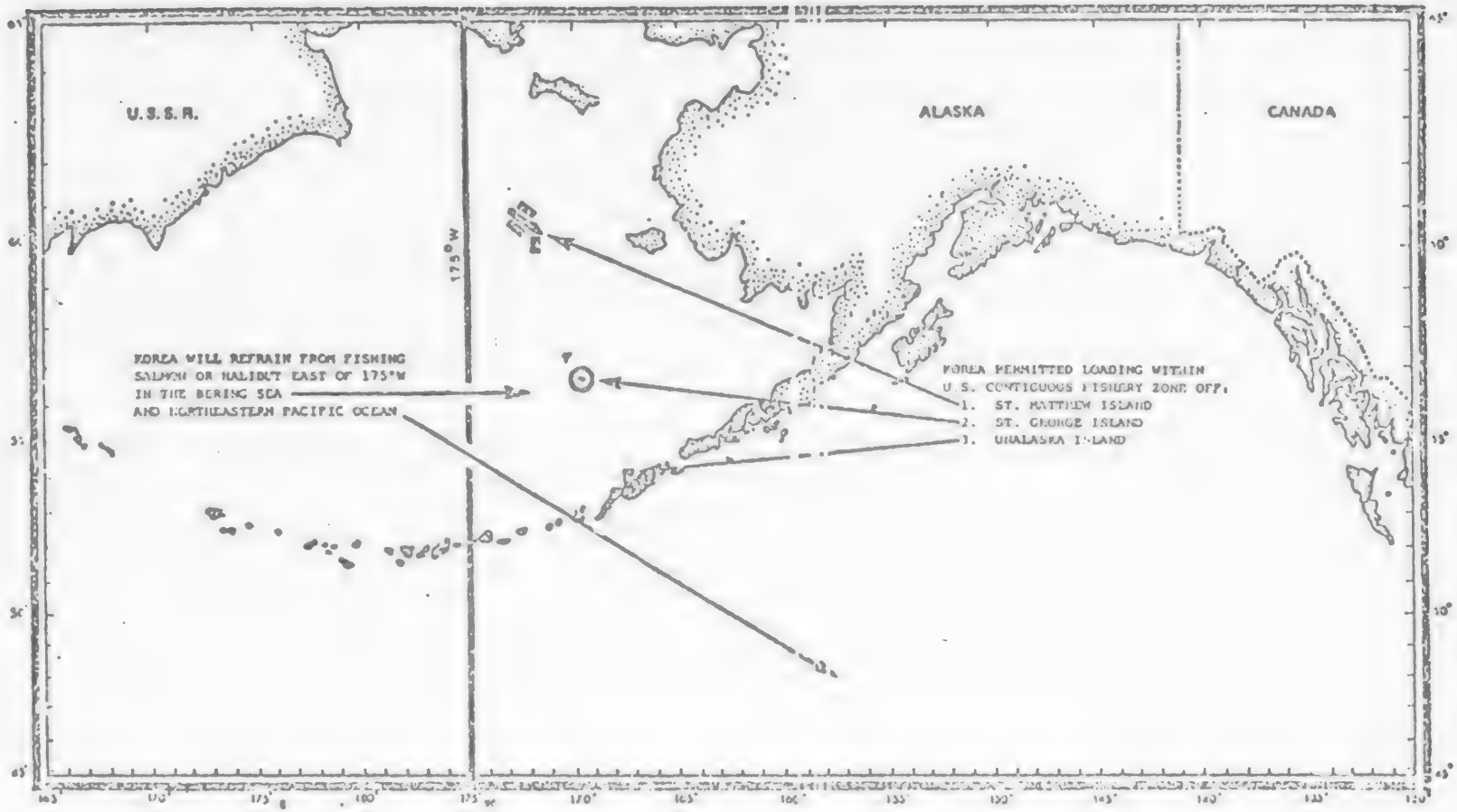


Figure 6.--Provisions of the United States-Republic of Korea Fisheries Agreement effective through December 12, 1977.

3.3.2.2 Purpose of regulatory measures.

The earliest restrictions placed on foreign fishermen were primarily to prevent conflicts between foreign mobile gear (trawls) and domestic fixed gear (crab pots and halibut setlines). In the early 1970's, when halibut production was low, at least partly because of the incidental catch by foreign trawlers, winter trawl closures in the central and western Gulf of Alaska (time and area of known halibut concentrations on the trawl grounds) were negotiated. Finally, beginning in 1973 when certain major groundfish stocks clearly began to deteriorate, national catch quotas were also negotiated.

3.3.3 Effectiveness of management measures (foreign and domestic).

Those regulations aimed at reducing gear conflicts were, without question, successful. Loss of U.S. fixed gear declined to a low level with recent losses occurring only in areas not covered by trawl closures.

Regulations designed to mitigate conservation problems, however, have not been effective, as witnessed by the fact that halibut, Pacific ocean perch, and sablefish stocks (which the majority of the measures were designed to protect) have continued to decline or remain at low levels of abundance. This occurred, at least partially, for three reasons: (1) Current year quotas (except for halibut) were determined from fishery data that were 1-2 years old, so by the time they were applied, stocks had deteriorated to the point where the quotas were obsolete; (2) quotas and other conservation measures were negotiated separately with each country in a political-diplomatic forum, where the sum of the individual national quotas ofter exceeded the total allowable catch, where different countries would only agree to different parts of an overall conservation program, and where scientific considerations were ofter compromised because of demands for unreasonable precision in estimates of stock condition; and (3) with respect to halibut, continuing incidental catches (and associated mortality) offset other conservation measures.

In the case of the halibut fishery, continual and substantial restrictions imposed on North American setline fishermen by IPHC, coupled with the negotiated winter trawl closures, have not, to date, arrested the decline in halibut abundance. The 1977 quota for the North American halibut setline fishery is less than half of that of 1971.

3.4 History of research.

Investigations of the groundfish resources of the Gulf of Alaska have been conducted by the United States, Canada, Japan, and U.S.S.R. Research efforts by the United States have been of the longest duration (1880 to present) and were initiated to assist the development of U.S. cod and halibut fisheries in the latter part of the 19th century. Canada began cooperative research with the United States on the halibut stocks of the Gulf of Alaska in the 1920's under the authority of the Halibut Conservation Treaty. This cooperative research continues to the present day under the direction of the International Pacific Halibut Commission. Research by Japan and the U.S.S.R. in the Gulf coincided with the development of their trawl fisheries in one Gulf of Alaska in the early 1960's.

3.4.1 United States. (See also 3.4.5.)

The earliest investigations of the bottomfish and shellfish of the northeastern Pacific and Bering Sea were those of the U.S. Fish Commission's steamer, *Albatross*, during the years 1889 through 1921. Included in these investigations were surveys of the cod and halibut banks of Alaskan waters.

In 1940 Congress provided funds authorizing the U.S. Fish and Wildlife Service to investigate the extent of the king crab resources off Alaska. Included in the king crab surveys of 1940 and 1941 was an assessment of groundfish potential in the western Gulf of Alaska and eastern Bering Sea. Sampling was conducted using standard commercial gear so that catch rates could be equated with those occurring in areas of established commercial fisheries. This was the first attempt to systematically examine the commercial potential of demersal fish and shellfish of Alaskan waters.

In 1953 assessment of Gulf of Alaska groundfish was resumed when the Bureau of Commercial Fisheries (BCF) vessel, *John N. Cobb*, conducted trawling off Yakutat. Since then the BCF (later the NMFS) carried out 19 cruises to examine the distribution, relative abundance, and biological characteristics of groundfish in various regions of the Gulf. Surveys conducted in 1973 through 1975 covered most of the Gulf of Alaska from Yakutat in the eastern Gulf to waters off Unalaska Island in the western Gulf. these surveys have provided the most recent estimates of exploitable biomass of pollock and other major groundfish species for this extensive region.

In addition to these trawl surveys of groundfish, NMFS scientists have studied the identification, distribution, and density of eggs and larvae of Gulf of Alaska groundfish. An icthyoplankton survey was conducted in the Kodiak region in 1972.

During the period 1964-69 U.S. observers were allowed aboard Japanese trawlers in the Gulf to record the incidence of halibut. The observer program was resumed in 1975 and its objectives were expanded to include the collection of information on catch composition and biological data on the target species and the recording the incidence of Tanner and king crab. In 1974 U.S. observers were allowed aboard U.S.S.R. trawlers in the Gulf. The observer program is presently an important research activity under the direction of NMFS.

From analyses of research data and of foreign fishery statistics, NMFS scientists prepare reports that assess the condition of specific groundfish resources as well as provide recommendations for resource use.

Scientists of the Alaska Department of Fish and Game compile and analyze catch and effort statistics from the domestic groundfish fisheries of the Gulf.

In 1971 the NMFS initiated a sablefish tagging program to study the relationship between (Thorsen and Shippen, 1975). Sablefish tagging was conducted in southeastern Alaskan waters in 1972 and 1973 using the U.S. research vessels, *George B. Kiley* and *John N. Cobb*. The tagging study became a cooperative endeavor when the fishery agencies of California and Oregon, and those of U.S.S.R. and Republic of Korea joined in the tagging program.

3.4.2. Canada.

For Canadian research conducted under the auspices of the International Pacific Halibut Commission see section 3.4.5.

During the period 1963-66, the Fisheries Research Board of Canada investigated the rockfish of the Gulf of Alaska. A trawl and echo-sounder survey was conducted using the research vessel *G.B. Reed*. Objectives of the survey were to examine the distribution, abundance, and biology of rockfish with primary emphasis on Pacific ocean perch (Westrheim, 1970). In 1970 further studies on rockfish of southeastern Alaskan waters were pursued using the *G.B. Reed*.

3.4.3 Japan.

Japanese research in the Gulf arose over concern by U.S. and Canadian scientists of the bycatch of halibut in the Japanese trawl fishery for Pacific ocean perch. Through the International North Pacific Fisheries Commission cooperative research was initiated in 1963 to determine the effect of Japanese trawl fisheries on halibut stocks.

Japan conducted experimental trawling to measure the incidence of halibut in trawl catches. U.S. observers were allowed aboard Japanese vessels to record the bycatch of halibut in the perch fishery. This arrangement continued until 1969. Also in 1963 Japanese exploratory trawlers were involved in the tagging of halibut in the western Gulf of Alaska. Tagging of halibut continued in 1964 and in various years from 1965 to 1970.

The first survey of groundfish resources by Japan of any magnitude occurred in 1965 when the biological characteristics and availability of groundfish were investigated. Tagging of both halibut and cod was conducted with some fishery experiments to measure the incidence of halibut in trawl catches. Research vessels surveys resumed in 1970 and continued until 1974 and were limited to the western Gulf of Alaska. Principal resources surveyed were those of pollock, Pacific ocean perch, and sablefish. During some of these surveys, investigations concerning the distribution of ocean perch were pursued. Sablefish were also tagged and the incidence of halibut in research trawl catches recorded.

Since 1963 Japan has reported to INPFC the incidence of haliblut in their trawl fisheries of the Gulf and detailed statistics on their groundfish fisheries including length frequency data on some of the principal species. Beginning in 1970 information on the age composition of some of the principal species in the fisheries has also been collected.

Japanese scientists have also submitted reports on the condition of Pacific ocean perch and sablefish stocks based on research vessel findings and fishery statistics.

3.4.4 U.S.S.R.

Soviet groundfish research in the Gulf of Alaska began in 1960 and was directed principally on rockfish, mainly Pacific ocean perch (Lyubimova, 1961 and 1962). Surveys were conducted to determine the extent of the resources, the behavior and movement of schools, and biological characteristics. Ichthyoplankton surveys were also conducted. In recent years U.S.S.R. research in the Gulf has shifted to pollock and Atka mackerel.

3.4.5 International Pacific Halibut Commission (IPHC).

Investigations by IPHC on the halibut resource and fishery cover a time span of some 50 years (1925 to present). One of the Commission's first major undertakings was a tagging program to determine the extent of migration of halibut between the various fishing banks in the northeastern Pacific and arrive at estimates of mortality. There had been earlier studies before the Commission was formed on the life history of halibut and management of the fishery (Thompson, 1916 a, b and 1917). Studies of the biology of halibut continued in the early 1930's and were concerned with the early life history, embryonic and larval development, location of spawning areas, the

transport of eggs and larvae, and the environment of halibut (Thompson and Van Cleve, 1936).

By the early 1930's the halibut stocks had declined to a low level of abundance, but through careful management by IPHC the stocks increased and began producing high catches in the Gulf of Alaska by the late 1950's.

Anticipating the eventual growth of foreign trawl fisheries in the Gulf of Alaska, IPHC completed a Gulf-wide and season survey of groundfish in 1961–63 to obtain information on the possible effects of such fisheries on the halibut stocks, and in turn, upon the Canadian and U.S. halibut setline fishery of this region (IPHC, 1964).

Later in the mid-1960's, IPHC resumed halibut tagging studies in the Gulf of Alaska and, in 1967, initiated an annual trawl survey of juvenile halibut as a means of measuring both the strength of year classes before their entry into the fishery and the impact of the trawl fisheries on the juvenile halibut population. In 1976 IPHC began an annual survey with setline gear to assess the adult portion of the halibut population in the northern Gulf of Alaska (Portlock and Albatross fishing grounds). The survey provides measures of stock density, recruitment, mortality, and growth, and halibut are tagged and released.

3.5 Socio-economic characteristics.

Historically, the domestic catch of groundfish in the Northeast Pacific has been small compared with the foreign harvest. With the creation of the fishery conservation zone by the Fishery Conservation and Management Act (FCMA) of 1976, and improving foreign and domestic market conditions, this pattern is expected to change dramatically in coming years. Most domestic groundfish landings are either the result of supplemental fishing activities between seasons for more economically attractive species, or are incidental to the harvest of another species. As economic barriers fall, permitting an increase in the domestic groundfish catch, considerable additional harvesting capacity can be expected to develop.

The economic and social data requirements for management will be more extensive than those for regulating an established domestic fishery; regulation of an industry in being requires information on the existing industry, those who consume its products, and those who earn their living from it. Regulation of a growing industry requires this as well as information on the factors which will influence, or be influenced by, growth. Additional information will include:

1. National and international marketing conditions and trends, including price trends.

2. Estimates of deployable harvesting and processing capacity and costs of deployment.

3. Information on where deployment into the fishery can be profitable in light of market and cost conditions.

4. Information on actual plans for entering the fishery at the harvestor or processor level.

5. Information on the economic and social condition of communities which may be involved in fishery expansion as a result of local community growth and change.

The following sections report information available at the time of writing.

As fishery management plans evolve, increasing amounts of this information are expected to become available.

3.5.1 Output of subject domestic commercial fishery.

Tables 8–14 show the domestic groundfish catch by gear type and INPFC statistic reporting area. Table 8 reports the total for all groundfish, and Tables 9–14 by species category.

These catch statistics are taken from Alaska Department of Fish and Game fish tickets. Groundfish are grouped into seven categories as indicated below:

Pacific ocean perch.
Other rockfish.
Sablefish.

Other flounder, including: turbot, Greenland turbot, flathead sole, Dover sole, rock sole, rex sole, butter sole, yellowfin sole, English sole, petrale sole, sand sole, Alaskan plaice.

Cod, including: Pacific cod.
Pollock.
Other, including: ling cod, bullhead, skates, unknown bottomfish.

Domestic groundfish harvests in the Gulf of Alaska during 1976, excluding halibut, was 3.64 million pounds, or 1,652 mt (Table 8). Southeastern dominated the catch with 2.89 million pounds or 79 percent of the total. Within Southeastern the most important domestic groundfish fishery was on sablefish using longline and pot gear—1.75 million pounds of sablefish or 48 percent of the Gulf of Alaska total. The fishery ranking next in importance was the Southeastern otter trawl flounder fishery (285 thousand pounds, 8 percent of the total), followed by the Southeastern pollock purse seine fishery (278 thousand pounds, 7 percent of the total), and the Southeastern setline fishery for rockfish (263 thousand pounds, 7 percent of the total).

TABLE 8

POUNDS OF GROUNDFISH CATCH
1976

All Species, (except halibut)

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine	277,572	546				278,118
Longline	1,845,899	46,984	141,723	12,134		2,046,740
Otter Trawl	431,164		409,557	107,306	29,317	977,344
Beam Trawl	961					961
Pots	310,000					310,000
Troll	22,293	6,164				28,457
Other	229					229
Total	2,888,118	53,694	551,280	119,440	29,317	3,641,849
					GRAND TOTAL	

TABLE 9

POUNDS OF GROUNDFISH CATCH 1/
1976

Sablefish

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline	1,441,257	12,234				1,453,491
Otter Trawl						
Beam Trawl						
Pots	304,451					304,451
Troll	986	161				1,147
Other	27					27
Total	1,746,721	12,395				
					GRAND TOTAL	1,759,116

1/ Believed to be dressed weight

TABLE 10

POUNDS OF GROUNDFISH CATCH
1976

Cod

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline	85,091	13,863	124,821	12,134		235,909
Otter Trawl	14,439		87,383	103,200	29,317	234,339
Beam Trawl						
Pots	5,549					5,549
Troll	10,055	2,998				13,053
Other	167					167
Total	115,301	16,861	212,204	115,334	29,317	489,017
					GRAND TOTAL	

Gear	Area	
06	B	27,212
07	B	1,100
		28,312

TABLE 11

POUNDS OF GROUNDFISH CATCH
1976

Pollock

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine	277,572					277,572
Longline						
Otter Trawl	132,000					132,000
Beam Trawl						
Pots						
Troll						
Other						
Total	409,572					409,572
					GRAND TOTAL	

TABLE 12

POUNDS OF GROUNDFISH CATCH
1976

FLOUNDERS OTHER THAN HALIBUT

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline						
Otter Trawl	284,725		54,089			338,814
Beam Trawl	961					961
Pots						
Troll						
Other						
Total	285,686		54,089			339,775
					GRAND TOTAL	

TABLE 13

POUNDS OF GROUNDFISH CATCH
1976

Rockfish

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine		546				546
Longline	263,368	10,424	754			274,546
Otter Trawl				4,066		4,066
Beam Trawl						
Pots						
Troll	3,744	1,002				4,746
Other						
Total	267,112	11,972	754	4,066		283,904
					GRAND TOTAL	

TABLE 14

POUNDS OF GROUNDFISH CATCH
1976

Other (except halibut)

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline	56,183	10,463	16,148			82,794
Otter Trawl			268,085	40		268,125
Beam Trawl						
Pots						
Troll	7,508	2,003				9,511
Other	35					35
Total	63,726	12,466	284,233	40		360,468
					GRAND TOTAL	

3.5.1.1 Value of catch (ex-vessel).

The value of the 1976 domestic groundfish harvest by gear type and major statistical reporting area is shown in Tables 15–21. Table 15 gives the total for all species and Tables 16–21 by species category.

Prices paid for bottomfish were drawn from Processors' Annual Reports which are received by the Alaska Department of Fish and Game. The 1976 reports called for total pounds bought and total amount paid for each species at each processor location. From this a weighted average price was calculated then checked with knowledgeable sources before being applied against fish ticket data.

The value of the 1976 domestic groundfish harvest in the Gulf of Alaska, excluding halibut, was $956,000. The Southeastern area accounted for $793,000 or 82 percent of the total value. The Southeastern area's longline and pot fisheries for sablefish accounted for $605,000 or 63 percent of the total value. The next three most important fisheries were: (1) The Kodiak area's otter trawl fishery for "other" species, used for crab bait, ($61,000, 6 percent of the total); (2) the Southeastern area's longline fishery for rockfish ($39,000 or 4 percent of the total); and (3) the Southeastern area's longline fishery for cod ($27,000, 3 percent of the total).

TABLE 15

VALUE OF GROUNDFISH CATCH
1976

All Species (except halibut)

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine	2,772	70				2,842
Longline	655,976	11,933	[illegible]	2,668		707,471 1/
Otter Trawl	25,830		91,615	21,581	5,863	145,087 2/
Beam Trawl	76					76
Pots	104,948					104,948
Troll	3,319	936				4,255
Other	45					45
Total	792,966	12,939	123,615	24,249	5,863	
					GRAND TOTAL	964,724 3/

1/ Includes 4,894 lbs. area unknown
2/ Includes 198 lbs. area unknown
3/ Includes total of 5,092 lbs. area unknown

TABLE 16

VALUE OF GROUNDFISH CATCH
1976

Sablefish

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline	595,096	4,991				600,087
Otter Trawl						
Beam Trawl						
Pots	103,950					103,950
Troll	337	58				395
Other	11					11
Total	699,394	5,049				
					GRAND TOTAL	704,443

TABLE 17

VALUE OF GROUNDFISH CATCH
1976

Cod

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline	13,519	2,487	27,001	2,668		50,569 1/
Otter Trawl	1,732		19,211	20,679	5,863	47,683 2/
Beam Trawl						
Pots	998					998
Troll	1,418	440				1,858
Other	30					30
Total	17,697	2,927	46,212	23,347	5,863	
					GRAND TOTAL	101,138

1/ Includes 4,894 lbs. area unknown
2/ Includes 198 lbs. area unknown

TABLE 18

VALUE OF GROUNDFISH CATCH
1976

Pollock

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine	2,772					2,772
Longline						
Otter Trawl	1,320					1,320
Beam Trawl						
Pots						
Troll						
Other						
Total	4,092					
					GRAND TOTAL	4,092

TABLE 19

VALUE OF GROUNDFISH CATCH
1976

FLOUNDERS OTHER THAN HALIBUT

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline						
Otter Trawl	22,778		11,898			34,676
Beam Trawl	76					76
Pots						
Troll						
Other						
Total	22,854		11,898			
					GRAND TOTAL	34,752

TABLE 20

VALUE OF GROUNDFISH CATCH
1976

Other Rockfish

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine		70				70
Longline	39,004	1,657	172			40,833
Otter Trawl				894		894
Beam Trawl						
Pots						
Troll	514	133				647
Other						
Total	39,518	1,860	172	894		
					GRAND TOTAL	42,444

TABLE 21

VALUE OF GROUNDFISH CATCH
1976

Other (except halibut)

Gear	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Purse Seine						
Longline	8,357	2,798	4,827			15,982
Otter Trawl			60,506	8		60,514
Beam Trawl						
Pots						
Troll	1,050	305				1,355
Other	▮					▮
Total	9,411	3,103	65,333	8		
					GRAND TOTAL	77,855

3.5.1.2 Description and value of product (wholesale).

Of food products, nearly 99 percent of the domestic groundfish catch from the Gulf of Alaska is processed into the frozen form. The remainder is processed into fresh, cured, and canned forms. Average annual production volume and value most recently (1972-75) were:

Species/group	Food product	Quantity (pounds)	Value
Halibut	Dressed (fresh and frozen)	16,848,600	$15,328,600
	Cheeks and fletches (fresh and frozen)	536,500	845,600
	Cured (smoked), 1972	50	100
	Canned, 1973	10,800	10,900
Sablefish	Dressed (fresh and frozen)	1,779,300	760,700
	Cured (salted and smoked), 1972	1,350	600
Bottomfish [1]	Fresh/frozen	469,600	141,800

[1]Category listed in Alaska Department of Fish and Game Statistical Reports. Assumed to be compromised of cods, flounders, rock fishes, etc.

Source: Alaska Department of Fish and Game (no date).

Frozen, dressed halibut and sablefish are in intermediate product form. They are exported from Alaska to undergo further processing into end-products of primarily fillet and steak for halibut, and smoked fish and fillet for sablefish. Information on product is not available on the rest of the bottomfish other than the indicated fresh/frozen form.

The domestic groundfish catch from the Gulf of Alaska is also used in the industrial products area—specifically the use of groundfish as bait in the various line and pot fisheries. Information on species composition and quantity is unavailable. However, an estimated 5.4 million pounds (2,449 mt) of groundfish are currently used as bait (1.0 million pounds of cod and 2.2 million pounds of other species by the halibut fishery). Based on the approximate price of 20 cents per pound reported for the Kodiak area, the implied value of the 5.4 million pounds of groundfish used for bait annually is $1.1 million. Groundfish are not heavily utilized for other industrial products such as meat and oil.

Table 22 reports annual wholesale value of Gulf of Alaska groundfish harvest from 1970 to 1975.

TABLE 22.—*U.S. Gulf of Alaska bottomfish (excluding halibut), catch and product 1970-75 (southeast and central district)*[1]

Species	Year	Catch	Dressed product*			
			Fresh/frozen		Cured	
			Quantity	Value	Quantity	Value
Sablefish	1970	814.1	534.4	187.8	0.8	0.2
	1971	696.3	611.7	158.5	.7	.2
	1972	1056.7	1645.3	500.0	1.4	.6
	1973	1911.2	1885.0	737.4	0	0
	1974	1718.1	1591.9	595.7	0	0
	1975	(?)	2194.0	1101.0	0	0
Bottomfish	1970	334.8	263.7	46.4	0	0
	1971	274.0	45.3	5.9	0	0
	1972	343.8	267.3	60.5	0	0
	1973	1430.5	749.1	300.2	0	0
	1974	194.8	847.5	302.8	0	0
	1975		14.5	3.9	0	0

[1]Source: Alaska Department of Fish and Game (no date).

*In thousands of pounds.

3.5.1.3 Markets, domestic and imports.

Domestic markets: U.S. markets for Alaska groundfish resources of Alaska pollock, Pacific cod, flounders, Pacific ocean perch and rockfishes will consist predominately of outlets for frozen fillets for consumer (institutions, restaurant and retail) outlets.

Consumption of frozen fish block and fillets by U.S. consumers in 1976 totalled 791 million pounds. The growth of 14 percent from 1975 consumption was primarily due to an increased use of blocks which rose to 401 million pounds—a 28 percent increase over 1975. Fillet consumption increased by 3 percent to 390 million pounds. Approximately three-fourths of the fish blocks and fillets are utilized in the restaurant and institutional trade.

The increase in U.S. consumption of frozen fish blocks and fillets in 1976 reflects the continuing upward trend of those products in U.S. markets. Since 1960, fish sticks and portions use has risen almost 400 percent while fillets utilization rose by 150 percent (Figures 7 and 8). Imports of blocks and fillets totalled 711 million pounds in 1976. Blocks accounted for 378 million pounds—an increase of 21 percent over 1975. Imports of fillets increased by 9 percent to 332 million pounds.

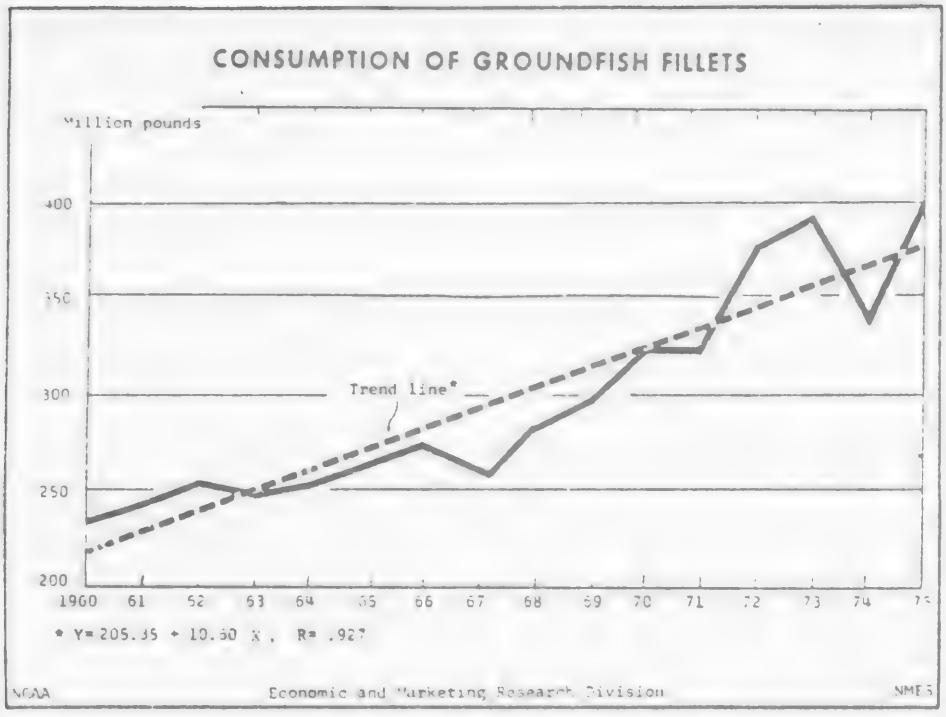


Figure 7

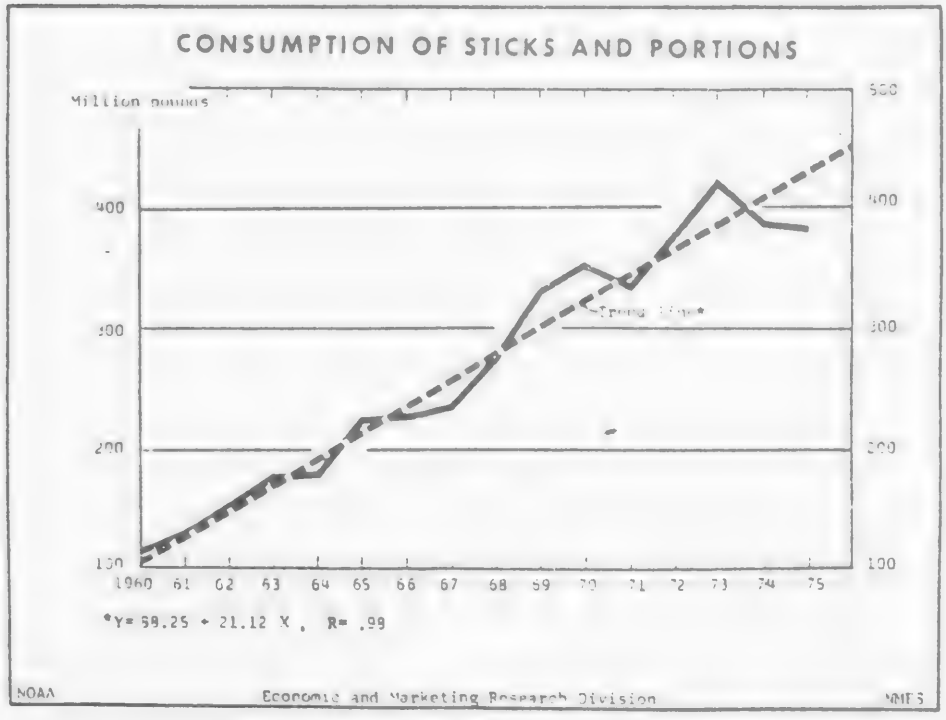


Figure 8

Factors affecting utilization: The statistics noted above indicate the general trend of the major markets Alaska groundfish will be entering. There is every reason to believe this upward trend will continue its pattern of the past 14 years. It can be affected, however, by (1) decrease of import supplies available to U.S. markets, (2) increase of blocks and fillets from U.S. fisheries or from imports, (3) price spread between fillets, sticks and portions and competing protein products such as meat and poultry, and (4) increase in per capita consumption of fillets, sticks and portions.

Import supplies: It is speculated that imports of fish blocks and fillets will not be sufficient to meet U.S. consumption needs in future years. Fishing restrictions and catch quotas imposed on some of the major importers have reduced inventories available for export. Demand for groundfish products has also increased in Northern European countries, thus reducing supplies that might be offered to U.S. buyers. For example, in September, 1976, Denmark decreased her exports of cod blocks to the U.S. to 41 percent of her inventory as compared to 73 percent of a year earlier. Low inventories of cod blocks in Canada and Greenland, and fishery products in the United Kingdom in 1976 also restricted exports.

Alaska pollock blocks imported from Japan and South Korea (ROK) were:

Total Atlantic and Alaska pollock blocks	Alaska pollock blocks[1]		
	Japan	ROK	Total
1973	66.4	60.7	1.4	62.1
1974	80.1	47.0	14.8	61.8
1975	74.8	15.5	36.7	52.2
1976	95.7	10.5	58.7	69.2

[1]In millions of pounds.

During the last 4 years, exports of pollock blocks from Japan have decreased while those from ROK have increased. It is very probable that exports of Alaska pollock blocks from both countries will decrease in 1977 and future years.

ROK fishing vessels have been expelled from the 200 mile zone off the eastern U.S.S.R. where they harvested some 347,000-600,000 mt annually. Japanese fishermen may suffer the same fate or, at most, be permitted only a fraction of their former catches of around one million metric tons annually. Pollock resources available to both countries have been further restricted through reduced quota allocations in the U.S. 200 mile extended jurisdiction zone.

Japan and ROK have thus become potential export markets for Alaska pollock products of frozen fish in the round, surimi (minced fish flesh), and roe when economic and political factors become suitable. ROK fisheries firms are negotiating for delivery of pollock and other groundfish from U.S. fishermen to ROK processing ships and purchase of round frozen pollock from U.S. processors. Japan will probably be a market for surimi and pollock roe when U.S. processors produce these products. Japan currently has an import quota on round pollock of 65,000 mt, but this will likely be increased or removed as her own fiseries off Alaska are further restricted.

Japan formerly caught around one million metric tons of pollock in waters off the U.S.S.R. and a similar amount off the U.S. and thus became a potential market for the amount of reduced catch imposed by both nations.

ROK is reported to need 350,000 mt of pollock over the 75,800 mt allocated to her fisheries in U.S. waters. If this catch is realized from ROK fisheries or by purchase from U.S. fishermen or processors, 50 percent of it will reportedly be processed into blocks and fillets for export to the U.S. This would amount to aroung 51,000 mt of finished product imported into the U.S., about double the ROK import in 1976.

Block and fillet prices: First wholesale prices on the Boston market of fish block and fillet products from cod, ocean perch, haddock and pollock rose sharply in 1976 as noted in figures 9 and 10 (from a report by the Market Research and Outlook Division of the Canadian Department of Fisheries and the Environment). Some leveling off occurred in most species of fillets in early 1977, but less so for block products, indicating some stabilization of the market. This has been brought about by the increasing price spread between seafood products and red meats and poultry. Fish prices have increased 30 percent in a relatively steady trend from January 1974 to October 1976 at the consumer price level. Meat and poultry prices have fluctuated somewhat but were at about the same level in October 1976 as in January 1974. Figure 11 indicates this price spread. The American Meat Institute estimates that domestic production of red meats will remain about the same in 1977 as in 1976.

Figure 9-- MID-MONTH WHOLESALE PRICES OF GROUNDFISH BLOCKS AT BOSTON, MASS.

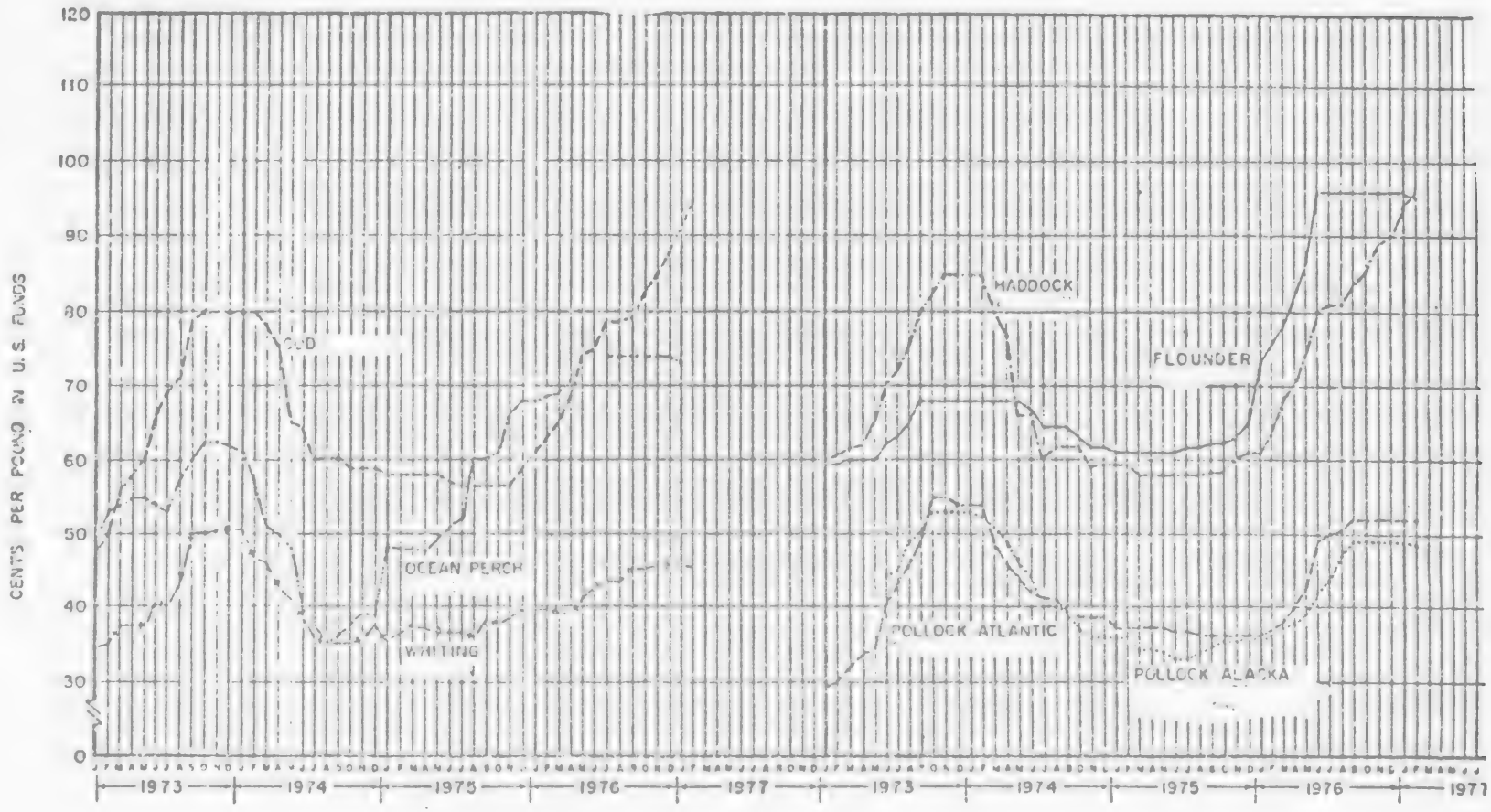
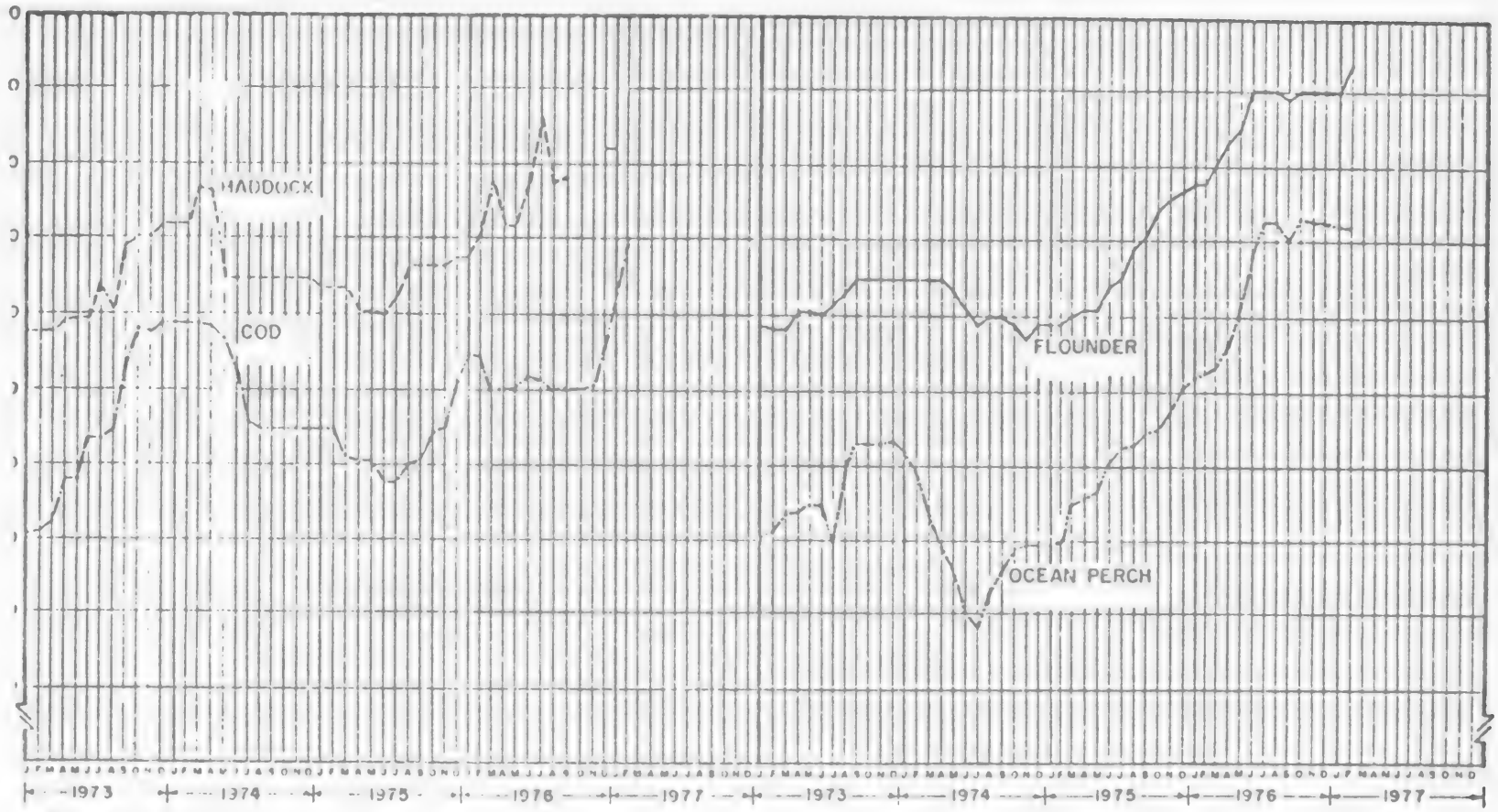
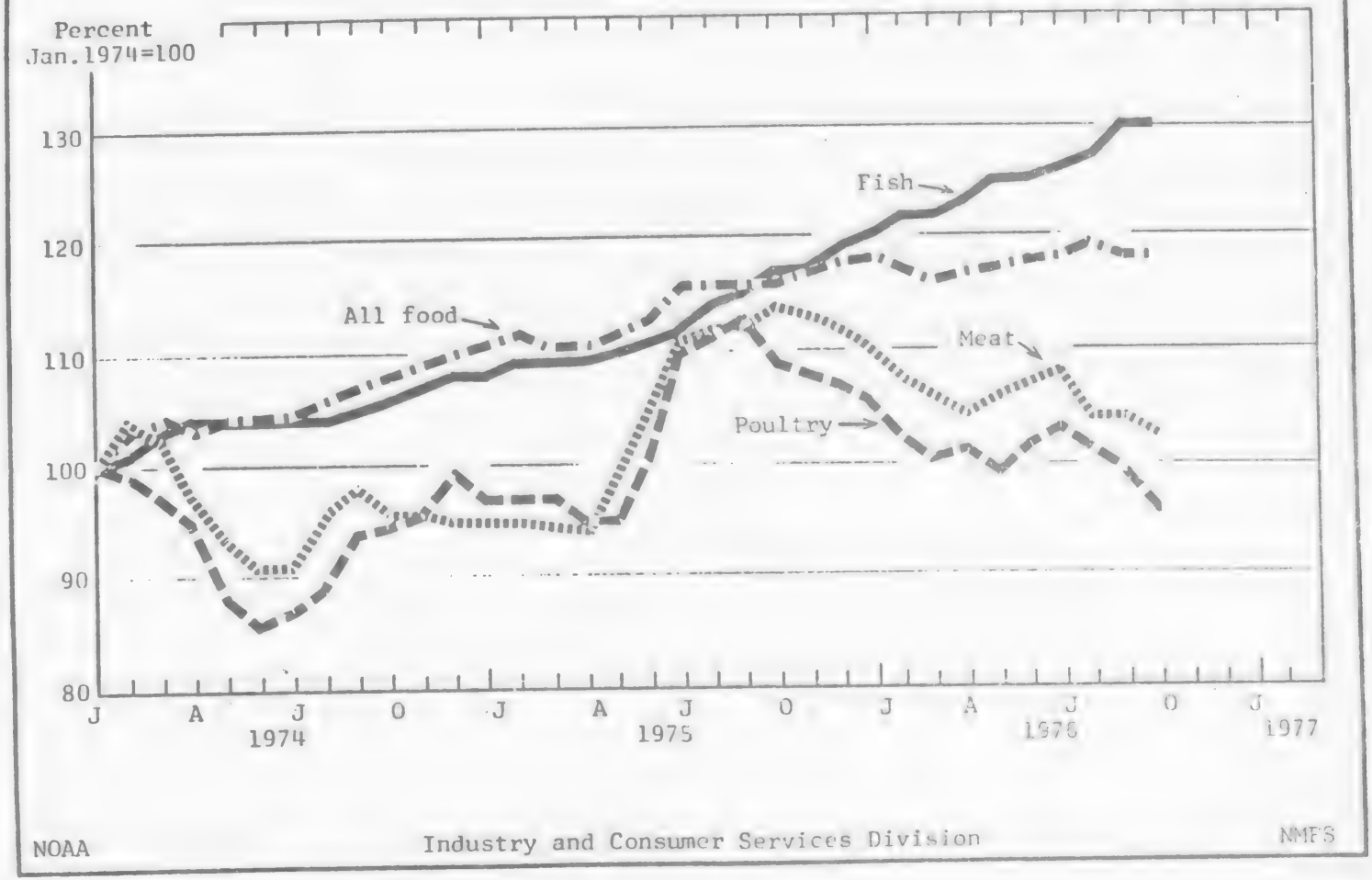


Figure 10--MID-MONTH WHOLESALE PRICES OF GROUNDFISH FILLETS (5 lb.)* AT BOSTON, MASS.



* Canadian/canadien

Figure11--CONSUMER PRICE INDEX FOR FISH, MEAT, POULTRY AND ALL FOOD



Although fish prices in general may stabilize, substitution of pollock blocks and fillets for similar cod products, which are in short supply, will likely cause good quality pollock products prices to increase—possibly as much as 10 cents per pound by the end of 1978. Good quality boneless and skinned Pacific cod fillets should also find a ready market at an attractive price to processors, as well as flounder species from Alaska waters which are known in the market places.

In order to fully utilize the harvest of trawl catches and to increase the yield of edible flesh from processed fish, it will be necessary for processors to produce minced fish blocks or other product forms from shredded fish flesh. Minced cod blocks have found limited market acceptance in the U.S. The quality of minced Alaska pollock blocks imported in 1973-74 from Japan was poor and generally rejected by U.S. fish stick and portion processors. Minced fish flesh, however, offers several avenues for product development, but all will require more extensive research and development and market promotion.

Sablefish markets: Sablefish has been primarily used for production of smoked products—2.9 million pounds in 1975—for U.S. markets; however, consumption of fresh and frozen fillets and steaks has been increasing—about 1.5 million pounds were processed in 1975, 0.9 million pounds in 1974, about 0.2 million pounds in 1973, 0.2 million pounds in 1970.

Japan had previously been a major exporter of sablefish into the U.S., where it was further processed into consumer products. Competition from Japanese and Canadian imports, coupled with a limited demand, has caused U.S. sablefish ex-vessel for new product forms from currently prices to fluctuate widely, and Japan is now seeking imports of sablefish from U.S. fisheries. The need to fill the vacuum in the market created by a cut-off of the Japanese supply, exports to Japan and possibly ROK, and increased U.S. consumption of fillets and steaks, has created a strong market for U.S. sablefish fisheries in 1977. Ex-vessel prices of 70¢/lb. for headed and gutted sablefish are being offered and may go even higher in 1977 unless U.S. buyers feel the price is more than U.S. consumers are willing to pay. It should be noted that the price quoted is for top quality products and will be scaled down for fish of inferior quality or size.

There is an excellent opportunity for development of the Alaska sablefish fishery to replace foreign fisheries in 1978 and future years.

U.S. landing of sablefish in 1976 were reported to have been 17.4 million pounds of which Alaska fisheries produced 2.6 million pounds. The export potential for Japanese markets in 1977 is not known at this time nor is the total marked demand in the U.S. These estimates will be obtained as information becomes available.

3.5.1.4 Impact of imports on domestic groundfish fishery development.

It is has been previously noted imports of fish block and fillet products from Northern European countries will likely decrease in future years. Since U.S. markets depend on imports for around 90 percent of their supplies, it is likely that a vacuum will develop in the market. This will result in increases in price levels and eventual loss of some markets. On the other hand, it provides marketing opportunity for U.S. processors of convention block and fillet products and unused groundfish species. It also will provide a more attractive import market for whiting and other species from southern hemisphere countries which will complete with Alaskan pollock markets.

Alaska pollock block products and to a lesser extent fillet products are finding increasing acceptance in U.S. markets. It is essential to maintain a supply source which will fill current demand and assure merchandisers adequate supplies for market expansion. Until U.S. processors are capable of filling the demand, it may be necessary to encourage import of Alaska pollock products from ROK fisheries in order to maintain markets. Because of the relatively strong demand, higher ex-vessel prices to fishermen and costs of freezing and selling by U.S. processors, wholesale prices of Alaska pollock prices will increase in 1977.

3.5.2 Domestic commercial fleet (vessels and/or gear) characteristics.

Table 23 describes the number of boats in each fishery.

Most informed observers of the domestic fishing sector anticipate that the majority of additional groundfish capacity will come from the existing domestic crab and shrimp fleets. On the basis of this information, the analysis of the U.S. groundfish harvest sector presented in these tables includes a capacity assessment of the existing shellfish fleet. Table 24 lists the number of bottomfish fishing permits sold in 1976. Tables 25-29 report vessels with bottomfish landings in each Alaska Department of Fish and Game adminstrative area.

The biggest catches of bottomfish occur with longline gear in Southeast. This gear is primarily used for halibut fishing. Declining quotas in the halibut fishery could prompt interest in longlining for bottomfish if market conditions are favorable.

Table 23. Total number, average net tons and keel lengths in 3-foot increments for boats in the crab, shrimp and bottomfish fisheries in Alaska in 1975. Actual total is the number of boats in each fishery minus duplicates participating in more than one fishery.

Keel Length	Net Tons Range	Net Tons Average	Actual No. of Boats	Number of Boats by Fishery* Crab	Shrimp	Bottomfish	Salmon**
1-24	1-5	3.0	46	7		39	26
25-27	1-12	6.0	38	6	2	32	23
28-30	1-13	6.4	75	16	5	56	54
31-33	4-14	7.9	109	27	11	82	81
34-36	2-23	9.5	124	29	14	83	100
37-39	3-22	13.7	101	30	6	67	82
40-42	6-26	16.5	62	16	5	39	37
43-45	6-35	17.6	48	17	6	27	31
46-48	9-50	27.2	41	17	2	24	27
49-51	5-58	34.0	70	44	[illegible]	29	38
52-54	15-39	27.8	11	6	2	4	1
55-57	21-31	25.2	7	3	1	3	
58-60	30-66	44.9	16	16		3	5
61-63	35-65	44.1	9	6	1	1	
64-66	35-94	52.8	18	12	7	3	
67-69	33-97	70.6	21	[illegible]	14	6	
70-72	49-134	77.2	25	19	6	2	
73-75	55-135	96.0	[illegible]	11	8	1	
76-78	55-120	92.2	19	14	[illegible]		
79-81	13-148	94.0	33	26	11	3	
82.84	79-179	135.6	27	24	7	1	
85-87	64-188	118.6	18	18	1		
88-90	81-198	136.8	[illegible]	3	1		
91-93	82-147	133.9	15	15	1	2	
94-96	83-143	114.5	4	3	1		
97-99	98-200	136.5	[illegible]	[illegible]	1		
100-102	130-199	151.0	4	4			
103-105	159-171	165.0	2	2			
106-108		139	1	1			
109-111	131-220	141.1	10	10	2		
112-114		134	1	1			
115-117		281	1	1			
118-120	129-201	165.0	[illegible]	2			
120+	106-338	234.6	9	9			
TOTAL			999	433	135	518	505

*Boats may make landings in more than one fishery.

**Salmon was added to show correlation with bottomfish and crab fisheries.

TABLE 24.-- 1976 Bottomfish Permits Sold

Number	Type	
4	C05B	sablefish - hand troll
8	C06B	" longline to 26' keel length
93	C61B	" longline over 26' keel length
19	C09B	" pots to 50' keel length
6	C91B	" pots over 50' keel length
130	- Subtotal, sablefish	
5	M01A	Bottomfish purse seine
10	M05B	" hand troll
66	M06B	" longline to 26' keel length
59	M61B	" longline over 26' keel length
7	M09B	" pots to 50' keel length
41	M07B	" otter trawl
6	M17B	" beam trawl
2	M99B	" other gear
194	- Subtotal, bottomfish, excluding blackcod and halibut	
324	- Total, all bottomfish, excluding halibut	

Note: Some fishermen held more than one permit, not all permit holders actually fished.

SOUTHEAST

Table 25. Average net tons and keel lengths (in 3-foot increments) of boats with bottomfish landings in Southeast Alaska in 1975. An asterick indicates that no reliable information was available (see Table23 for statewide fleet averages of net tons.)

Keel Length	Troll Gear No. of Vessels	Troll Gear Average Net Tons	Longline Gear No. of Vessels	Longline Gear Average Net Tons	Pot Gear No. of Vessels	Pot Gear Average Net Tons	Trawl Gear No. of Vessels	Trawl Gear Average Net Tons
ALL SPECIES OF BOTTOMFISH EXCEPT SABLEFISH								
1-24	40	*	65	*				
25-27	16	*	24	*				
28-30	37	*	33	*	1	*	3	*
31-33	46	*	52	*				
34-36	51	9.1	62	*	3	*		
40-42	73	*	70	15.4				
43-45	11	18.8	33	16.4				
46-48	11	25.1	23	24.7				
49-51	7	25.0	23	27.9	3	38.3		
52-54			2	26.5				
55-57			2	25.5				
58-60	1	31.0	2	36.5				
64-66			2	35.0				
67-69			1	93.0				
70-72			*	*				
79-81			4	120.0				
88-90	1	152.0						
120+	1	*						
TOTAL	295		400		7		3	
SABLEFISH								
1-24	1	*	13	2.6				
25-27	1	*	*	4.4				
28-30	1	*	7	5.1	1	4.0	1	*
31-33			20	5.4				
34-36	1	10.0	27	25.4	3	*		
40-42	2	17.0	34	14.9	1	25.0		
43-45			17	16.3	1	29.0		
46-48			15	25.6				
49-51			14	31.5	3	42.6		
52-54			3	26.6	1	27.0		
55-57			1	22.0				
58-60			2	36.5				
64-66			1	35.0	1	35.0		
67-69			2	125.5				
70-72			1	69.0	1	51.0		
79-81			1	107.0				
TOTAL	6		163		12		1	

PRINCE WILLIAM SOUND

Table 26. Average net tons and keel lengths (in 3-foot increments) of boats with bottomfish landings in Prince William Sound, Alaska in 1975. An asterick indicates that no reliable information was available (see Table23 for statewide fleet averages of net tons.)

Keel Length	Troll Gear No. of Vessels	Troll Gear Average Net Tons	Longline Gear No. of Vessels	Longline Gear Average Net Tons	Pot Gear No. of Vessels	Pot Gear Average Net Tons	Trawl Gear No. of Vessels	Trawl Gear Average Net Tons
ALL SPECIES OF BOTTOMFISH EXCEPT SABLEFISH								
25-27			5	*				
28-30			6	*				
31-33			1	*				
34-36			3	*			3	41.0
40-42			1	20.0				
46-48			1	26.0				
TOTAL			17				*	

COOK INLET

Table 27. Average net tons and keel lengths (in 3-foot increments) of boats with bottomfish landings in Cook Inlet, Alaska in 1975. An asterick indicates that no reliable information was available (see Table23 for statewide fleet averages of net tons.

Keel Length	Troll Gear No. of Vessels	Troll Gear Average Net Tons	Longline Gear No. of Vessels	Longline Gear Average Net Tons	Pot Gear No. of Vessels	Pot Gear Average Net Tons	Trawl Gear No. of Vessels	Trawl Gear Average Net Tons
ALL SPECIES OF BOTTOMFISH EXCEPT SABLEFISH								
28-30			3	*				
31-33			2	*				
52-54			1	29.0				
61-63			1	35.0				
120+			3	*				
TOTAL			10					
SABLEFISH								
64-66			1	77.0				
TOTAL			1					

KODIAK

Table 28. Average net tons and keel lengths (in 3-foot increments) of boats with bottomfish landings in Kodiak, Alaska in 1975. An asterick indicates that no reliable information was available (see Table23 for statewide fleet averages of net tons.)

Keel Length	Troll Gear No. of Vessels	Troll Gear Average Net Tons	Longline Gear No. of Vessels	Longline Gear Average Net Tons	Pot Gear No. of Vessels	Pot Gear Average Net Tons	Trawl Gear No. of Vessels	Trawl Gear Average Net Tons
ALL SPECIES OF BOTTOMFISH EXCEPT SABLEFISH								
25-27			1	5.0				
28-30			2	4.5				
31-33			1	7.0				
34-36			2	*				
40-42			2	17.0			3	25.0
49-51			3	36.6			3	35.3
55-57			1	30.0				
64-66							3	44.0
70-72							1	94.0
73-37							2	135.0
79-81							3	115.0
TOTAL			12				15	

UNIMAK

Table 29. Average net tons and keel lengths (in 3-foot increments) of boats with bottomfish landings in Kodiak, Alaska in 1975. An asterick indicates that no reliable information was available (see Table 23 for statewide fleet averages of net tons.)

Keel Length	Troll Gear No. of Vessels	Troll Gear Average Net Tons	Longline Gear No. of Vessels	Longline Gear Average Net Tons	Pot Gear No. of Vessels	Pot Gear Average Net Tons	Trawl Gear No. of Vessels	Trawl Gear Average Net Tons
ALL SPECIES OF BOTTOMFISH EXCEPT SABLEFISH								
67-69							5	71.6
70-72							4	83.0
73-75							1	135.0
79-81							1	105.0
82-84							1	105.0
TOTAL							12	

The existing halibut fleet consists mostly of smaller vessels (mostly 50-foot seiners) which fish for halibut off-shore in the Gulf of Alaska.

Most of the state's larger boats are crabbers found in the westward region (Kodiak, Unimak, Bering Sea, Adak, and the Western Aleutians). This crab fleet contains some boats under 50 feet which by Alaskan regulations are eligible to fish salmon, but the majority of king crab boats are in excess of 50 feet, and are not allowed to fish salmon. These larger vessels fish off-shore and most fish in more than one area.

Most of the boats which fish in the westward region and record bottomfish landings, are Kodiak area shrimp trawlers. These trawlers use single and double otter trawls and beam trawls. Many of the larger boats (60 feet and over) also spend part of the year as packers and tenders. Data on the halibut fleet are unavailable, but it is anticipated that halibut longline fishermen would have been credited with a considerable portion of the groundfish catch.

Some groundfish are taken incidentally for use as crab bait. Our figures do not completely reflect this situation. Conversations with crabbers from Cook Inlet indicate that significant amounts of groundfish are taken incidental to Tanner crab and shrimp fishing. Some fishermen actively target on groundfish for bait.

Tables 30-45 give the 1975 shellfish catch by species, gear type and administrative area. Included in the tables is information on keel length and tonnage of vessels in each fishery.

The fleet capacity descriptions, i.e., keel length and net tons, were taken from 1975 vessel registry files. The same data for 1976 is unavailable at this time. The catch information accompanying the fleet characteristics information is also 1975 data and is intended to demonstrate the distribution of the catch among the vessel length categories in each area. The total catch information used in sections 3.5.1.1 and 3.5.2.1 and 3.5.2.3 are 1976 figures and therefore will not coincide with catch figures accompanying section 3.5.2 and 5.1.1. (Tables 30-45.)

1975 OTTER TRAWL HARVEST OF SHRIMP IN CHIGNIK[1]

Table 30. Average net tons and keel lengths (in 3-foot increments) of boats with shrimp landings. Bottomfish and crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Shrimp	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Crab
49-51	3	34-54	42.6	213,428				
64-66	3	47-74	60.0	1,085,827	1	*		
67-69	11	33-89	69.6	6,563,805	3	54,409		
70-72	7	64-105	82.4	2,758,449				
73-75	3	93-135	117.3	892,826	1	*		
76-78	[illegible]	80-115	102.2	1,298,138				
79-81	10	74-117	104.5	7,501,582	1	*		
82-84	5	79-151	111.6	4,201,936	1	*		
85-87	1		91	*				
88-90	3	124-152	136.6	858,305				
91-93	1		138	*				
97-99	1		138	*				
TOTAL	52			25,640,816	7	85,732		

[1] The computer printout used for these figures placed shrimp landings in ADF&G salmon areas. Because Chignik is not a shellfish area, no crab landings show up for boats in this table.

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

[illegible]

Table [illegible]. Average net tons and keel lengths (in 3-foot increments) of boats with [illegible] landings. Bottomfish and crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Shrimp	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Crab
49-51	2	40-58	49				2	*
64-66	1		54					
67-69	7	52-89	73.8	4,703,129			1	*
70-72	2	66-105	85.5	1,091,873				
73-75	2	93-122	107.5	1,485,934			1	*
76-78	[illegible]	93-110	100.5	6,[illegible]46,[illegible]09				
79-81	4	105-117	109.0	2,538,561				
82-84	2	108-151	129.5	*			1	*
97-99	1		138	*				
TOTAL	25			20,424,450			5	702,177

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 OTTER AND BEAM TRAWL AND POT GEAR HARVEST OF SHRIMP IN KODIAK

Table 32. Average net tons and keel lengths (in 3-foot increments) of boats with shrimp landings. Bottomfish and crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Shrimp	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Crab
				OTTER TRAWL				
37-39	1		14	*			1	*
40-42	1		25	*	1	*	1	*
49-51	6	28-54	40.0	2,421,010	2	*	*	1,646,903
52-54	1		31	*				
55-57	1		17	*				
61-63	1		41	*				
64-66	5	27-74	50.2	3,532,225	1	*	1	*
67-69	10	33-80	61.8	9,267,812			*	*
70-72	7	49-105	80.0	6,174,173	1	*	2	*
73-75	4	76-135	107.0	5,224,518	1	*		
76-78	5	80-120	106.0	3,318,696	1	*	1	*
79-81	7	74-115	102.7	5,231,708			3	872,903
82-84	5	79-132	110.4	2,547,305	1	*	2	*
85-87	1		91	*			1	*
88-90	3	124-152	136.6	1,955,391			2	*
94-96	1		135	*				
109-111	2		135	*			2	*
TOTAL	61			42,976,865	8	49,919	22	7,858,491
				BEAM TRAWL				
31-33	1		8	*				
34-36	5	10-23	14.6	998,631			1	*
37-39	5	14-22	19.4	910,289			1	*
43-45	3	13-21	17.0	94,174			1	*
49-51	1		38	*				
TOTAL	14			2,022,114			3	90,946
				POT GEAR				
1-24	2			*				
31-33	2	10-13	11.5	*			1	*
34-36	1		10	*				
TOTAL	5			4,576				

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 OTTER TRAWL AND POT GEAR HARVEST OF SHRIMP IN PRINCE WILLIAM SOUND

Table 33. Average net tons and keel lengths (in 3-foot increments) of boats with shrimp landings. Bottomfish and crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Shrimp	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Crab
				OTTER TRAWL				
34-36	1		12	*	1	*	1	*
67-69	1		80	*				
TOTAL	2				1		1	
				POT GEAR				
31-33	1		7	*				
40-42	1		10	*				
TOTAL	2							

*The asterisk indicates that pounds had to be omitted to protect confidentiality.

1975 BEAM TRAWL AND POT GEAR HARVEST OF SHRIMP IN SOUTHEAST

Table 34. Average net tons and keel lengths (in 3-foot increments) of boats with shrimp landings. Bottomfish and crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Shrimp	No. of Boats	Pounds of bottomfish	No. of Boats	Pounds of Crab
				POT GEAR				
31-33	1		[redacted]	*	1	*		
37-39	1		10	*				
46-48	1		29	[redacted]				
49-51	1		27	*	1	[redacted]		
TOTAL	[redacted]			5841	2	[less than 100 lbs]		
				BEAM TRAWL				
25-27	1		5	*			1	[redacted]
28-30	1		6	[redacted]				
34-36	1		14	*			1/2	*
				2584				[more than 5000 lbs]
40-42	[redacted]	13-14	13.5	*				
43-45	3	16-25	20.0	[redacted]				
	5			733,079				
46-48	1		20	[redacted]				
49-51	1		27	[redacted]				
52-54	1		[redacted]	[redacted]				
	3			281,597				
TOTAL	11			1,017,260			2	[more than 5000 lbs]

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 OTTER TRAWL AND POT GEAR HARVEST OF SHRIMP IN COOK INLET

Table 35. Average net tons and keel lengths (in 3-foot increments) of boats with shrimp landings. Bottomfish and crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Shrimp	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Crab
				OTTER TRAWL				
40-42	2	12-25	18.5	*				
73-75	1		40	*				
79-81	1		115	*			1	*
TOTAL	4			4,525,959			1	*
				POT GEAR				
25-27	1		*	*				
28-30	4	2-15	7.7	*			2	*
	5			75,958			2	
31-33	*	5-11	8.7	101,699			4	11,681
34-36	4	5-12	8.0	23,047	1	*		
43-45	3	8-17	15.3	13,498	1		1	*
64-66	1		46	*				
73-75	1		40	*				
76-78	1		93	*			1	*
	3			10,917			1	*
TOTAL	23			225,118	2	*	8	39,210

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN BERING SEA

Table 36. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
58-60	1		66	*			1	*
61-63	1		40	*				
67-69	1		*	*				
70-72	3	76-134	106.3	835,406			1	*
73-75	*	108-133	116.8	1,561,621			*	*
76-78	*	73-107	91.7	1,33,053				
79-81	14	77-198	132.2	4,236,999			3	441,648
82-84	13	108-154	137.2	6,101,339			*	475,264
85-87	*	98-138	120.3	4,354,884			1	*
88-90	*	138-198	157.5	2,776,525			2	*
91-93	15	134-147	138.4	9,348,869			*	1,358,376
94-96	3	83-180	135.3	1,817,421			1	*
97-99	6	98-200	136.5	2,794,693			*	*
100-102	3	130-199	155.6	2,453,955			2	*
103-105	*	159-171	165.0	*				
106-108	1		139	*				
109-111	7	131-135	133.0	4,266,362			2	*
112-114	*		134	*				
115-117	*		281	*				
118-120	2	129-201	165.0	*				
120+	*	106-243	196.2	2,385,329			1	*
TOTAL	101			52,588,012			25	6,586,015

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN SOUTHEAST

Table 37. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
31-33	1		5	*	1	*	1	*
34-36	2		14	*	1	*	2	*
37-39	1		15	*			1	*
40-42	3	15-27	22.0	13,467			3	50,663
43-45	3	18-21	20.0	7,580	1	*	1	*
46-48	2	29-45	37.0	137,930	1	*	1	*
49-51	9	26-49	36.0	207,183	4	26,224	6	297,241
52-54	2	26-27	26.5	*	1	*	1	*
55-57	2		24.0	*			2	*
58-60	2	37-43	40.0	*	1	*	2	*
85-87	1		64	*			1	*
TOTAL	28			560,938	10	100,822	19	1,140,978

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN PRINCE WILLIAM SOUND

Table 38. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
31-33	1		10	*			1	*
37-39	4	12-22	17.7	3260			4	299,857
40-42	1		22	*			1	*
49-51	3	18-28	23.0	*			2	*
58-60	1		30	*			1	*
64-66	1		40	*			1	*
TOTAL	10			53,423			10	1,044,053

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN KODIAK

Table 39. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
1-24	4	2-5	4.0	21,246				
25-27	2		5	*	1	*	1	*
28-30	9	5-10	6.6	202,502			2	*
31-33	13	4-13	9.5	306,913	1	*	5	71,018
34-36	15	4-16	11.6	634,196			[illegible]	380,785
37-39	11	11-22	16.4	451,750	1	*	4	202,819
40-42	[illegible]	19-27	24.6	431,883	1	*	1	*
43-45	4	19-35	22.7	295,202			2	*
46-48	4	20-38	30.5	347,334			4	67,331
49-51	15	24-54	39.1	2,325,296	1	*	9	3,125,746
52-54	2	16-31	23.5	*			2	*
55-57	[illegible]	21-30	25.5	*			1	*
58-60	2	31-59	45.0	*			[illegible]	*
61-63	[illegible]	21-65	43.0	343,176			3	525,748
64-66	8	34-80	57.8	934,442			6	1,276,884
67-69	7	66-97	78.1	1,674,184			[illegible]	2,125,692
70-72	[illegible]	35-105	75.1	1,020,392			5	996,360
73-75	5	55-109	73.8	1,135,987			4	513,246
76-78	7	52-155	90.3	1,072,219			4	215,318
79-81	[illegible]	13-125	92.1	1,254,168			3	508,197
82-84	11	105-179	141.4	2,500,979			5	1,436,276
85-87	5	91-185	127.4	1,219,844			3	391,069
88-90	4	89-152	126.5	1,006,764			2	*
91-93	3	82-138	118.0	852,375			2	*
94-96	1		97	*				
97-99	1		[illegible]	*				
100-102	1		137	*			1	*
109-111	3	125-220	160.0	2,079,972			1	*
112-114	1		134	*			1	*
120+	3	293-338	311.3	576,893				
TOTAL	168			23,009,980	5	11,191	82	15,553,694

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN SOUTH PENINSULA

Table 40. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
34-36	3	11-15	12.6	47,040				
37-39	2		12.0	*				
40-42	2	15-22	18.5	*			1	*
43-45	3	16-27	22.0	154,859			2	*
46-48	3	21-47	31.3	238,022			3	638,535
49-51	3	19-58	32.3	750,874			5	1,325,338
58-60	4	40-60	50.2	373,831			4	999,913
64-66	[illegible]	41-72	56.5	*			1	*
67-69	2	38-89	63.5	*			2	*
73-75	1		122	*			1	*
76-78	[illegible]	68-71	69.5	*			2	*
79-81	1		67	*			1	*
85-87	1		104	*			1	*
94-96	1		143	*				
TOTAL	30			2,595,455			23	3,964,549

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN DUTCH HARBOR

Table 41. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
31-33	1		[redacted]	*				
34-36	1		12	*				
43-45	1		21	*				
46-48	1		20	*				
61-63	1		40	*				
67-69	1		89	*			1	*
70-72	3	76-134	106.3	433,507				
73-75	4	108-133	115.5	1,539,587			1	*
76-78	3	92-107	98.0	484,391				
79-81	13	77-198	128.9	2,398,892				
82-84	9	108-154	137.4	823,837				
85-87	7	98-188	128.4	1,408,860			1	*
88-90	2	138-151	144.5	*				
91-93	7	134-147	138.5	1,279,851				
94-96	2	83-143	113.0	*				
97-99	5	114-200	144.2	717,438				
100-102	2	130-138	134.0	*				
103-105	1		159	*				
106-108	1		139	*				
109-111	4	131-135	133.0	1,704,735				
118-120	2	129-201	165.0	*				
120+	4	106-219	178.7	421,568				
TOTAL	75			14,043,373			3	77,346

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN ADAK

Table 42. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
70-72	1		134	*				
76-78	[redacted]	107-120	113.5	*				
82-84	2	133-154	143.5	*				
85-87	4	83-138	123.0	107,873				
88-90	4	137-198	157.2	338,911			1	*
91-93	9	134-281	154.1	548,250				
94-96	1		180	*				
97-99	1		200	*				
100-102	1		138	*				
103-105	1		171	*				
109-111	3	131-135	133.0	193,828				
115-117	1		281	*				
118-120	2	129-201	165.0	*				
120+	3	193-243	211.0	239,779				
TOTAL	35			2,395,[illegible]7			1	*

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN WESTERN ALEUTIANS

Table 43 Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
73-75	1		112	*				
79-81	1		134	*				
100-102	1		138	*				
103-105	1		171	*				
106-108	1		139	*				
TOTAL	5			254,570				

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

1975 HARVEST OF KING CRAB IN COOK INLET

Table 44. Average net tons and keel lengths (in 3-foot increments) of boats with king crab landings. Bottomfish and tanner crab landings by these same boats are also shown. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of King Crab	No. of Boats	Pounds of Bottomfish	No. of Boats	Pounds of Tanner Cr.
1-24	2			*				
25-27	1		5	*				
28-30	7	3-15	8.2	61,719			4	50,210
31-33	8	5-10	6.6	536,369			4	67,122
34-36	8	5-14	8.2	241,690			2	*
37-39	10	12-38	19.8	576,245			7	351,895
40-42	2	18-19	18.5	*			1	*
43-45	3	6-19	14.0	27,713			2	*
46-48	3	19-50	34.5	71,980			3	126,996
49-51	3	32-55	46.3	285,824			3	488,876
58-60	4	30-108	53.0	240,193			4	503,915
61-63	2	38-66	52.0	*			2	*
64-66	1		40	*			1	*
67-69	1		93	*			1	*
70-72	5	55-105	70.6	388,694			2	*
79-81	2	108-115	111.5	*			1	*
82-84	3	131-146	136.0	472,815			1	*
85-87	1		72	*			1	*
TOTAL	64			3,565,646			39	3,490,320

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

TABLE 45.--1975 HARVEST TANNER CRAB NOT INCLUDED IN THE KING CRAB TABLES

Table Average net tons and keel lengths (in 3-foot increments) of boats with tanner crab landings not included in the King crab tables. [In reporting pounds landed, some keel length categories were combined to protect confidentiality.]

Keel Length	No. of Boats	Net Tons Range	Net Tons Average	Pounds of Tanner Crab	No. of Boats	Pounds of Salmon
			SOUTHEAST			
37-39	1		9	*		
58-60	1		66	*		
61-63	1		43	*		
TOTAL	3			340,333		
			PRINCE WILLIAM SOUND			
1-24	1			*		
37-39	1		17	*	1	*
40-42	3	10-25	17.3	620,020	3	*
46-48	1		21	*		
49-51	2	35-38	36.5	*		
52-54	1		30	*		
58-60	1		57	*		
70-72	1		57	*		
TOTAL	11			1,705,101	4	377,134
			COOK INLET			
49-51	1		31	*		
TOTAL	1			*		
			KODIAK			
25-27	1		9	*	1	*
31-33	1		12	*	1	*
37-39	1		22	*	1	*
70-72	1		70	*		
73-75	1		109	*		
TOTAL	5			195,059	3	184,797

*The asterisk indicates that pounds had to be omitted to protect confidentiality. The pounds landed in these cases are included in the final total.

3.5.2.1 Total gross income of fleet. Table 46 shows revenues of the domestic groundfish fishery, by gear type. Longline vessels and those using pot gear made up 58 of the 73 vessels targeting on bottomfish. The majority of these vessels fished in the Southeastern area. Average gross income for all vessels was $9,746 during 1976. Ves- sels fishing for salmon with [illegible] highest gross income ($17,[illegible]. Purse seiners were the lowest with $702.

[illegible] gross income from ground- [illegible] for 1976 is given in [illegible] 42 51 show average gross [illegible] by gear type.

TABLE 46

AVERAGE GROSS INCOME/VESSEL
FOR TARGET GROUNDFISH

1976

Gear type	ADF&G Gear Load	Southeastern No. of Ves.	Southeastern Total Value	Southeastern Avg. Value	Yakutat No. of Ves.	Yakutat Total Value	Yakutat Avg. Value	Kodiak No. of Ves.	Kodiak Total Value	Kodiak Avg. Value	Chirikof No. of Ves.	Chirikof Total Value	Chirikof Avg. Value	Shumagins No. of Ves.	Shumagins Total Value	Shumagins Avg. Value	TOTAL FOR ALL AREAS No. of Ves.	TOTAL FOR ALL AREAS Total Value	TOTAL FOR ALL AREAS Avg. Value
Longline	06/61	44	474,742	10,789	1	1,212	1,212	6	19,572	3,262	1	[illegible]	[illegible]			-	52	496,228	9,543
Otter trawl	07/27	2	25,831	12,915	-	-	-	9	69,093	7,677	1	11,249	[illegible]			-	14	108,173	7,727
Pots	09/91	6	104,954	17,492	-	-	-	-	-	-	-	-	-	-	-	-	6	104,954	17,492
Purse seine	01	3	2,106	702	-	-	-	-	-	-	-	-	-	-	-	-	3	2,106	702
Troll	05/15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bear trawl	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	55	607,633	11,048	1	1,212	1,212	15	88,670	5,911	6	13,954	2,325			-	73 1/	711,466	9,746

1/ Number of vessels non-additive (multiple gear, multiple area vessels counted only once).

TABLE 47

AVERAGE GROSS INCOME/VESSEL

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Central Target Groundfish $	Shumagins Target Groundfish $	Total for All Areas Target Groundfish $	Total $ Earned
1			2,318	895		[illegible]	[illegible]
2				3,392		[illegible]	[illegible]
3			340			[illegible]	146,950
4	9,315					9,315	12,[illegible]
5	8,519					[illegible]	64,[illegible]
6	1,669					[illegible]	[illegible]
7			16			[illegible]	[illegible]
8			39			[illegible]	[illegible]
9	13					[illegible]	[illegible]
10			4,146			[illegible]	[illegible]
11			2,497			[illegible]	[illegible]
12			23,018			23,018	156,508
13			2,832	292		3,124	14,254
14			7,374			[illegible]	[illegible]
15	20,795					[illegible]	[illegible]
16	51,218					[illegible]	[illegible]
17	64,057					[illegible]	[illegible]
18	275					275	[illegible]
19	5,561					[illegible]	[illegible]
20	34,862					34,862	[illegible]
21	10,471					10,471	[illegible]
22	2,697					[illegible]	6,497
23	3,668					[illegible]	[illegible]
24	53					[illegible]	[illegible]
25	7,353					[illegible]	[illegible]
26	25,173					[illegible]	[illegible]
27	193					193	[illegible]
28	3,534					[illegible]	[illegible]
29	3,061					[illegible]	[illegible]
30	3,100					3,100	[illegible]
31		1,212				[illegible]	[illegible]
32	18,486					[illegible]	[illegible]
33			14,175			14,175	[illegible]
34	20,274					[illegible]	[illegible]

TABLE 47 (Continued--b)

AVERAGE GROSS INCOME/VESSEL

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
35	20,079					20,079	168,516
36	4,826					4,826	65,084
37	26,502					26,502	252,360
38	1,946					1,946	55,196
39	575					575	197,664
40	7,093					7,093	37,496
41	3,609					3,609	16,511
42	947					947	19,417
43	13,499					13,499	68,541
44	38,750					38,750	48,582
45	15,226					15,226	134,691
46	7,788					7,788	19,105
47	1,256					1,256	233,015
48	217					217	59,453
49	4,022					4,022	30,847
50	84					84	1,713
51	3,436					3,436	53,650
52	3,658					3,658	3,658
53	6,507					6,507	26,122
54	6					6	22,270
55			11,840	4,291		16,131	120,842
56				359		359	21,945
57			558			558	558
58				4,312		4,312	290,564
59	1,320					1,320	1,320
60	1,915					1,915	51,514
61	8,204					8,204	38,620
62	18,515					18,515	49,564
63			138			138	138
64			17,526			17,526	81,711
65	19					19	22,021
66	7,547					7,547	87,665
67	328					328	51,720
68	3,929					3,929	165,744

TABLE 47 (Continued--d)

AVERAGE GROSS INCOME/VESSEL

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
69			1,662			1,662	165,077
70	25,952					25,952	124,372
71	20,451					20,451	80,307
72	11,149					11,149	19,528
73	52,012					52,012	121,632

TABLE 48

AVERAGE GROSS INCOME/VESSEL

OTTER TRAWL
1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
1			2,119	895		3,014	206,027
2				3,392		3,392	240,219
3			340			340	146,950
10			4,146			4,146	48,156
11			2,597			2,597	35,657
12			23,018			23,018	155,508
14			7,374			7,374	64,649
20	24,511					24,511	182,521
55			11,840	4,291		16,131	130,853
56				359		359	21,945
58				4,312		4,312	290,563
59	1,320					1,320	1,320
63			138			138	138
64			17,526			17,526	81,711

TABLE 49

AVERAGE GROSS INCOME/VESSEL

PURSE SEINE

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
18	275					275	65,535
39	575					575	187,664
47	1,286					1,286	233,015

TABLE 50

AVERAGE GROSS INCOME/VESSEL

[illegible] LINE (Excluding Halibut)

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
4	9,315					9,315	12,805
5	8,539					8,539	62,233
6	1,668					1,668	7,818
7			16			16	2,155
8			339			339	39,491
9	13					13	149
13			2,822	702		3,524	14,254
15	20,785					20,785	121,564
16	51,218					51,218	203,555
19	5,561					5,561	95,211
20	10,351					10,351	182,521
22	2,697					2,697	6,497
23	1,608					1,608	6,001
24	53					53	18,538
25	7,353					7,353	39,160
26	25,123					25,123	64,764
27	193					193	11,926

TABLE 51

AVERAGE GROSS INCOME/VESSEL

LONG LINE (Excluding Halibut)

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
28	3,534					3,534	40,919
29	3,061					3,061	81,794
30	3,100					3,100	21,948
31		1,212				1,212	46,587
32	18,486					18,486	54,510
33			14,175			14,175	99,338
34	20,274					20,274	34,747
35	20,079					20,079	168,516
36	4,826					4,826	65,084
37	26,502					26,502	252,360
38	1,946					1,946	55,186
40	7,093					7,093	37,496
41	3,609					3,609	16,511
42	947					947	19,417
43	13,499					13,499	68,541
44	38,750					38,750	48,582
45	15,226					15,226	134,691

TABLE 52

AVERAGE GROSS INCOME/VESSEL

LONG LINE (Excluding Halibut)

1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
46	7,788					7,788	19,105
49	4,022					4,022	30,847
50	84					84	1,711
51	3,436					3,436	53,650
52	3,658					3,658	3,658
53	8,507					8,507	36,599
54	6					6	29,276
57			558			558	980
60	1,915					1,915	51,534
61	8,204					8,204	38,620
62	18,535					18,535	49,564
65	19					19	22,021
66	7,547					7,547	87,685
69			1,662			1,662	165,077
71	20,451					20,451	80,307
72	11,149					11,149	19,528
73	52,012					52,012	121,632

TABLE 53

AVERAGE GROSS INCOME/VESSEL
FOR GEAR
1976

Vessel Number	Southeastern Target Groundfish $	Yakutat Target Groundfish $	Kodiak Target Groundfish $	Chirikof Target Groundfish $	Shumagins Target Groundfish $	TOTAL FOR ALL AREAS Target Groundfish $	Total $/Vessel
17	64,067					64,067	141,233
21	10,471					10,471	56,614
48	217					217	99,453
67	328					328	53,720
68	3,929					3,929	105,744
70	25,952					25,952	134,372

3.5.2.2 Investment in vessels and gear.

No information available.

3.5.2.3 Annual participation in subject fishery.

Table 54 shows the number of groundfish landings by species and area. The number of fishing days per landing was not determined.

TABLE 54

NUMBER OF LANDINGS/SPECIES/AREA

1976

Targeted Species	Southeastern	Yakutat	Kodiak	Chirikof	Shumagins	Total
Pacific Ocean Perch	-	-	-	-	-	-
Other Rockfish	836	46	3	1	-	886
Sablefish	485	36	-	-	-	521
Other Flounder	10	-	8	-	-	18
Cod	488	34	113	28	10	673
Pollock	7	-	-	-	-	7
Other	-	-	-	-	-	-
Total	1,826	116	124	29	10	2,105

3.5.2.4 Total Manpower employed.

The information available with respect to manpower and income is presented in Section 3.5.3

3.5.2.5 Economic viability (net income and efficiency).

Inadequate information available.

3.5.3 Domestic commercial processing characteristics.

3.5.3.1 Total gross income of area processors.

In 1975, the latest year for which data area available, the total first wholesale value of all fishery products taken in Alaska was $293 million. Twelve of the companies surveyed to determine groundfish plans for 1978 indicated recent (1976 and 1976-77) gross annual sales totaling $226 million. The survey apparently covered a substantial portion of the processing industry and could be considered representative of current conditions.

3.5.3.2 Investment in plant, equipment, etc.

Fourteen companies responded to the request for information on plant investment. They indicated a total investment of $80.3 million in 24 locations in the Gulf of Alaska and Unalaska. This would be an average of $3.3 million per location.

Industry plans for 1978 include the expansion of capacity in 16 locations. The investment projections are not available, but will no doubt range widely, since plans vary from installing machinery in existing plant space to construction of additional processing and freezing facilities in order to enter the groundfish fishery.

3.5.3.3 Total employment and labor income.

In 1975, 21,860 commercial fishermen operating 11,630 vessels grossed $125 million in Alaska's commercial fisheries.[2] Three general categories of commercial fishing are reported as follows:

	Pounds	Value
Salmon	137,606,813	$55,301,908
Shellfish	246,857,711	55,272,050
Other fish	52,810,240	14,357,369
Total	437,274,764	124,931,328

For the same year, the Alaska Department of Labor reported 47,011 man months of Food and Kindred Products manufacturing in Alaska exclusive of meat, dairy, grain mill and bakery products, fruit and vegetable preservation and beverage manufacturing.[3] The payroll was $39 million for the classification (Miscellaneous Foods and Kindred Products) which includes fish processing, with an average monthly employment of 3918. A survey of the Alaska food processing industry from August of 1974 to March 1975, indicated that the number of people involved in fish processing exclusive of managerial personnel was 3,463.[4] Therefore, it is assumed that the miscellaneous Food and Kindred Products classification in the Statistical Quarterly is a reasonably accurate measure of the seafood processing industry.

3.5.3.4 Economic viability.

No information available.

3.5.4 Recreational fishing characteristics.

In most areas of the state, groundfish, excepting halibut, are not highly regarded as sportfish. Minor fisheries for flounder and black rockfish exist near population centers of western Alaska such as Kodiak. In Southeastern sportfishermen occasionally jig for

[2] Alaska Department of Fish and Game Preliminary Catch and Production Commercial Fisheries Statistics, 1975.

[3] Alaska Department of Labor 1975 Statistical Quarterly.

[4] Alaska Department of Labor, Occupational Employment Statistics for Alaska. Employment Estimates in Selected Occupations in Food Processing—Printing and Publishing—Wood Products.

black rockfish or for the deeper dwelling red snappes[5]; however, as often as not rockfish caught while trolling are discarded, being considered inferior to the highly prized coho and king salmon.

The Seward area has the only intensive groundfish sportfishery. In close proximity to the population centers of the Anchorage area and with Army and Air Force recreation camps nearby, Resurrection Bay supports a fishery for groundfish of some 20,000 man-days, equal to the highly publicized salmon sportfishery.

Although sportfishing for halibut is very popular and halibut derbies are enthusiastically supported by various communities throughout the state, the sportfish fishery for other species can in general be considered as a recreational/subsistence fishery with sport gear.

3.5.5 Subsistence fishing characteristics.

The coastal Native people of Alaska have historically relied heavily on marine resources for their subsistence. The Aleuts and Koniags utilized not only marine mammals and salmon extensively, but also other fish species such as halibut, cod, flounders, greenling, and smelt. Collins (1945) described the jig fishery for Atka mackerel in inshore waters, the drying of capelin and the taking of sculpins for human consumption. Halibut, turbot, and cod were fished in depths to 60 fathoms using line of sinew or kelp, V-shaped wooden and bone hooks, floats of carved wood or inflated seal stomachs, and stone anchors (Hrdlicka, 1945). Clark (1974) and DeLaguna (1964) describe the use of similar techniques in the Kodiak and Yakutat areas, respectively. In addition to salmon, the Tlingit and Haida of the Yakutat and Southeastern areas relied most heavily on halibut, herring, and smelt. In the early protohistoric period much of the fish was eaten raw or boiled or broiled, cod being one species which was always cooked before consumption.

Today the use of fish for subsistence, with the exception of salmon, is considerably less than during the period prior to the establishment of local stores and easily accessible packaged and canned foods. Of the groundfish species halibut is most extensively preferred and utilized statewide. Clark (1974) has noted the continued use of cod and poggie (greenlings) in the Aleutians. Flounder and sculpin are occasionally speared in shallow lagoons of the Kodiak area, and in Southeast Alaska the Native people continue to subsist on the traditional species. The indigent Native families are at times heavily dependent on various groundfish species. Cod is seldom if ever eaten, however, and rockfish are eaten only rarely.

The commercial fishermen of Alaska subsist to varying degrees on incidental groundfish. The magnitude of utilization, although extensive, is hard to estimate and of course depends on individual cultural heritage and preference. Pacific cod is the most favored of those retained.

3.5.6 Indian treaty fishing characteristics.

Two coastal Indian reservations, Annette Island and the Karluk are on Alaska's coast. These reservations extend 3,000 feet seaward from land, and are, therefore, well within State waters. While the Indians generally abide by State laws and regulations (with the exception of the Annette Island salmon traps), the Secretary of the Interior has the authority to regulate the fisheries within the reservation boundaries.

3.5.7 Other activities directly related to fishing.

A potential source of impact on marine resources and fisheries is the exploration and development of oil and gas deposits along the Outer Continental Shelf (OCS) of Alaska. As manager of the Outer Continental Shelf Leasing Program, the Bureau of Land Management (BLM) of the Department of Interior has initiated the Outer Continental Shelf Environment Assessment Program (OCSEAP) as an essential part of its management responsibilities to ensure that the marine environment is not seriously disturbed or altered. In each OCS area for which development is proposed (Figure 12), extensive environmental studies are to be conducted before such development is allowed (or disallowed). In this regard, numerous studies have been underway for several years now under the auspices of OCSEAP.

3.5.8 Area community characteristics.

Profiles for over 100 Alaska coastal communities are available for reference at the following sites: North Pacific Fishery Management Council Headquarters;[6] National Marine Fisheries Service, Alaska;[7] and Northwest Regional Offices;[8] Northwest and Alaska Fisheries Center;[9] and Alaska Department of Fish & Game Headquarters.[10]

3.6 Interaction between and among user groups.

3.6.1 Domestic.

The potential for conflicts between domestic users will be increased both directly and indirectly with the advent of an extensive groundfish trawl fishery. Presently within the shellfish fisheries there exist gear conflicts between the users of mobile and stationary gear, specifically between the shrimp trawlers and king and Tanner crab fishermen, and occasionally halibut fishermen. Because of the relatively restricted inshore distribution of commercially harvestable shrimp stocks and the timing of the shrimp and crab seasons, user groups can choose alternate grounds and thereby reduce confrontations between user groups. However, with a groundfish fishery dragging within a wide range of depths and habitat types, voluntary actions on the part of the fishermen may no longer present a workable solution to the problem.

Indirect competition involving the capture and destruction of incidentally caught species especially with regard to long established crab and halibut fisheries presents another potential conflict among domestic fishermen. Legal-sized male, juvenile and female crabs and juvenile and adult halibut are distributed over vast areas of the Continental Shelf. From National Marine Fisheries Service surveys, it is known that groundfish and crab distributions overlap to a substantial degree. Further study is necessary to delineate potential groundfish fishing grounds with respect to shellfish and halibut distributions and thereby determine the extent of potential conflict.

The majority of groundfish landed within Alaska are caught with stationary gear; the trawl fisheries for flounders and pollock in Southeastern and the bait fishery within the remainder of the State are restricted in area; these trawl fisheries, considering the cooperative aspect, are providing the crab fishermen with a necessary commodity, bait; and most groundfish fishermen are engaged in other fisheries. Therefore, conflicts can presently be considered to be at a minimum.

3.6.2 Trawl vs. halibut.

The halibut fishery in the Gulf of Alaska is affected by domestic fisheries for shrimp, crab, and groundfish (primarily sablefish), and by foreign fisheries for groundfish. The kinds of impacts include destruction of gear, preemption of fishing grounds, and a reduction in abundance that results from that incidental capture of halibut.

The effects of domestic fisheries on halibut are less than by foreign fisheries. Gear conflicts between domestic fisheries are minimal, but the annual halibut incidental catch by domestic fishermen, although not precisely known, may be as high as 2,000 mt west of Cape Spencer (IPHC Area 3). In recent years, this would represent about 30 percent of the catch by the halibut fishery in this area. Most of the incidental catch occurs in the shrimp and crab fisheries as the domestic trawl fishery for groundfish in the Gulf of Alaska is insignificant at present. However, a major impact on the halibut fishery could occur if effort toward groundfish increases. An incidental catch of about 2,000 mt now occurs annually in the Canadian and U.S. trawl fishery for groundfish off British Columbia (Hoag, 1971).

Regarding foreign fisheries, halibut fishermen occasionally report instances of gear destruction or preemption of grounds. This type of interference probably would be even greater except that foreign fleets have traditionally fished for species (e.g., Pacific ocean perch) that generally are deeper than halibut. An increase in conflicts can be expected if foreign fleets shift to more shallow water species such as Pacific cod or rock sole. The more important effect of foreign fishing is that of incidental catches. Although foreign vessels target on species other than halibut, halibut are taken incidentally in substantial numbers. Regulations require that halibut caught by Japanese fishermen be released, but most die

[5]Red Snapper are any of several red rockfish species, e.g., *S. ruberimus* or *S. alutus*.

[6]P.O. Box 3136DT, Anchorage, Alaska 99510.

[7]P.O. Box 1668, Juneau, Alaska 99802.

[8]1700 Westlake Avenue North, Seattle, Wash. 98109.

[9]2725 Montlake Boulevard East, Seattle, Wash. 98112.

[10]Subport Building, Juneau, Alaska 99801.

from injuries received during capture (Hoag, 1975). Hoag and French (1976) used data collected by observers to estimate the annual incidental catch by foreign trawlers in the Gulf of Alaska (including the British Columbia Coast). Their estimates show that the catch peaked in 1965 at about 9,000 mt (1,500,000 fish) but more recently has averaged about 4,000 mt. The majority of these halibut were 3 to 7 years old and less than 10 pounds. Total (foreign plus domestic) incidental trawl catch in recent years, therefore, has averaged about 8,000 mt. Estimates of the incidental catch by the foreign sablefish fishery are not available. Halibut often are hooked on sablefish gear, and North American fishermen have been asked to return sablefish hooks found in halibut; over 200 of these hooks were returned in 1975. Most of the hooks were found in halibut over 5 kg., an indication that smaller halibut are either not able to escape or are not hooked.

Hoag (1976) used estimates of the incidental halibut catch (excluding the catch by the domestic shrimp and crab fisheries) and assessed the effect of trawling on the North American setline fishery for halibut. The results showed that trawling reduced the survival of juvenile halibut and, therefore, recruitment to the setline fishery. The estimated yield loss to the setline fishery was substantial, averaging about 5,000 mt annually since 1967 and representing nearly 50% of the setline catch west of Cape Spencer in recent years.

Since 1975, foreign trawling in the Gulf has been prohibited in specified areas and times in order to reduce the halibut catch by trawlers, provide protection for spawning stocks, and allow important halibut grounds to remain undisturbed for several months before the opening of the halibut season (see Sections 8.3.1. and 8.3.2). Although beneficial, area-time closures in the Gulf have not been as successful in reducing the incidental catches as those in the Bering Sea, the difference being that halibut in the Gulf are not concentrated in a relatively small geographic area as they are in the Bering Sea. Halibut concentrations occur throughout the Gulf; if fishing effort by trawlers is merely shifted from closed to open areas where the incidence of halibut is nearly as high, then savings from the present closures will be minimal.

The incidental catch of halibut in the Gulf varies with target species, season and depth. The incidence of halibut observed in the Japanese fishery during the 1960's is shown by month and area in the following table 55 (Hoag and French, 1976). Data were not available for many area-month blocks, but some differences were apparent. The incidence was highest during the winter and spring, averaging about 10 halibut per metric ton of total catch and exceeding 20 per metric ton in several areas. The incidence during the summer and fall was less than one per metric ton. The difference apparently is due to the depth fished. Groundfish trawls, fished primarily for Pacific ocean perch, operated at depths of 200–400 meters. Shrimp trawls were fished at 100–200 meters. Data from research surverys with trawls (IPHC, 1964; Hughes, 1974; Hughes and Alton, 1974) shows that halibut occur over a broad range of depths but usually are concentrated at depths of 100–300 meters during the winter and spring and less than 100 meters during the summer. Therefore, halibut tend to be in shallower water during the summer than that in which the trawl fishery operates. The depth fished, however, does vary with target species. In the past, foreign trawlers have fished for Pacific ocean perch that generally inhabit depths over 200 meters. The primary target species has recently shifted to pollock, but pollock also tend to be deeper than halibut during the summer and fall, and the highest incidence of halibut in a pollock fishery is likely to occur during the winter and spring. The same is true for species such as sablefish and turbot. Exceptions to this pattern probably occur with shallow water species such as rock sole and Pacific cod.

Table 55 -

Average incidence and weight of halibut in Japanese trawls in the northeast Pacific by month, area, and trawl type, 1963-1969.

INPFC Areas - Trawl Type	Month								
	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Groundfish Trawls	Incidence (Number per metric ton)								
Shumagin	0.404	10.932	4.724	2.235	0.300	1.038	-	-	3.750
Chirikof	22.142	1.200	22.680	2.010	0.354	0.181	0.902	1.035	0.128
Kodiak	3.138	4.566	6.729	8.411	0.601	0.255	0.228	0.526	2.337
Yakutat	-	-	14.250	-	-	0.841	0.460	0.237	-
Southeastern	-	-	-	-	-	0.174	0.056	-	-
Charlotte	-	-	-	1.188	1.391	0.068	0.044	-	-
Vancouver	-	-	-	0.000	-	-	0.000	-	-
Shrimp Trawls									
Shumagin	-	-	-	8.906	5.083	3.500	-	-	-
Chirikof	7.500	-	-	-	8.388	2.165	4.884	-	-
Kodiak	11.249	-	37.127	36.475	29.300	-	4.455	3.019	-
Groundfish Trawls *	Weight (kg)								
Shumagin	3.55	2.00	2.18	1.98	2.10	2.50	-	-	1.86
Chirikof	8.45	8.41	2.04	5.22	2.60	13.36	13.90	-	-
Kodiak	2.77	1.81	2.59	2.61	7.09	15.56	6.69	4.87	3.05
Yakutat	-	-	3.41	-	-	9.20	13.45	12.10	-
Southeastern	-	-	-	-	-	13.50	-	-	-
Shrimp Trawls									
Shumagin	-	-	-	2.40	2.40	2.40	-	-	-
Chirikof	5.20	-	-	-	1.10	4.89	5.61	-	-
Kodiak	4.54	-	0.93	2.50	3.18	-	3.30	2.84	-

* Data not available in Charlotte-Vancouver areas.

Gear modifications offer an opportunity to save halibut without seriously affecting operations for other fisheries. If properly fished, halibut usually are not caught in pelagic trawls. In 1976, gear experiments were conducted to test the effects of off-bottom versus on-bottom trawls (Pereyra et al., unpublished document submitted in INPFC in 1976). Data were collected on Japanese stern trawlers fishing for pollock with two types of trawls: an on-bottom net that is commonly used in the Japanese pollock fishery, and an experimental off-bottom net that was similar in construction to the on-bottom net except that dropper chains of up to 2 m were placed between the bobbins and footrope. The average incidence was 1.9 halibut per metric ton of groundfish in the on-bottom net compared to 0.7 per metric ton in the off-bottom net. Another important result was that trawlers apparently can successfully harvest pollock with the off-bottom net; in fact, the groundfish catch was actually higher with the experimental off-bottom trawls, 9.5 mt per hour compared to 8.8 mt per hour in the on-bottom nets.

3.6.3 Trawl vs. salmon.

During the mid-1970's Japan and the U.S.S.R. permitted U.S. scientific observers aboard their trawlers fishing in the northeastern Pacific to sample the catch. One of the observers' duties was to determine the incidence of salmon in the daily trawl landings. Although sampling was limited and did not occur in all areas each month, salmon were observed in trawl catches in each of the major statistical areas from Shumagin Area to Vancouver Area.

Table 56 shows that average incidence of salmon by area and month for Japanese and U.S.S.R. trawlers from data collected in 1976. The highest incidence occurred on a U.S.S.R. trawler in the Kodiak area in August, the result of generally large catches of salmon on two separate days during the nine days of sampling. Other fairly high incidence rates of salmon occurred mainly during March and April and in December. Because of the limited sampling it is not possible to make an estimate of the total incidental catch of salmon by trawlers in the northeastern Pacific.

Salmon taken by trawlers in the northeastern Pacific were all chinook salmon (*Oncorhynchus tschawytscha*) with the exception of two instances in which a sockeye salmon (*O. nerka*) was observed in the catches.

Available data are too scant to project future incidental salmon catches in foreign and domestic groundfish fisheries or their impact on salmon resources.

Table 56--Average incidence of salmon (number per metric ton of groundfish catch) in catches by Japanese and USSR trawlers in the northeastern Pacific Ocean by area and month, 1976 (U.S. observer data).

	Statistical Area				
Month	Shumagin	Chirikof	Kodiak	Yakutat	Southeastern
Japanese vessels					
January					
February					
March				0.457	0
April	0.555			0.065	0.066
May			0	0.014	0
June			0		
July					
August	0	0	0		
September			0.024	0	0
October					
November			0.032		0.003
December	0	0.074	0.703		
USSR vessels					
January					
February					
March					
April					
May					
June					
July			0.051		
August			6.655		
September					
October		0	0		
November					
December			0.019		

Blank blocks indicate no sampling occurred; 0 indicates no salmon were observed during the sampling

3.7 Federal and State revenues derived from fishery.

Federal revenues are based on charges placed on foreign fisheries, while State (Alaska) revenues are based on fees and taxes placed on the domestic fishery.

3.7.1 Federal revenues.

A summary of U.S. revenues expected in 1977 from charges placed on foreign nations fishing within the 200 mile zone in the Gulf of Alaska is presented below.

Expected U.S. revenue from foreign nations, Gulf of Alaska, 1977.1/ (preliminary)

Type of Revenue	Total	Country Japan	U.S.S.R.	Poland	ROK	Taiwan	Unallocated
Income from vessel fee	179,100	22,500	111,200	6,000	39,300	100	0
Income from poundage fee	1,545,800	836,700	477,100	26,200	151,100	2,600	52,100
Reimbursable income2/ (U.S. Observer cost)	140,200	55,100	55,100	20,000	10,000	---	---
[illegible]	---	---	---	---	---	---	---
Total	1,865,100	914,300	634,400	52,200	200,400	2,700	52,100

1/ Source: Natl. Mar. Fish. Serv., Div. Int. Fish. (March 16, 1977).
2/ Source: Resour. Ecol. Fish. Mgt. Div., Northwest Alaska Fish. Cent., NMFS

Revenues from vessel and poundage fees total $1,724,900 for 1977. Reimbursable income (to cover the cost of placing U.S. observers aboard foreign fishing vessels in the Gulf of Alaska is tentatively estimated at $140,200 Fines and penalties are tied to violations and are, therefore, variable income items. The expected total U.S. revenue for 1977 is around $1,865,100.

3.7.2 State revenues.

Average annual State revenue derived from the domestic groundfish fishery in the Gulf of Alaska is presented below.

State of Alaska revenue from domestic groundfish fishery in the Gulf of Alask
FY 1973-76 average, (approximation)

Type of revenue	State-wide total	Gulf of Alaska Groundfish fishery halibut2/	halibut3/
(1) Raw fish tax	1,615,800	79,600	9,700
(2) Cold storage tax (Including freezer ship)	1,159,300	132,300	55,800
(3) Vessel and gear licenses	559,200	26,100	3,500
(4) Commercial fish licenses	342,300	29,500	4,100
Annual Total	$3,676,600	$267,500	$73,100

1/ Source: Alaska State Department of Revenue
2/ Revenue was estimated as 4.920% of state-wide total of type (1); 11.408% (2); 4.66% (3); and 8/615% (4).
3/ Revenue was estimated as 0.600% of state-wide total of type (1); 4.813% (2); 0.634% (3); and 1.209% (4).

Excluding the halibut fishery, State revenue from the domestic groundfish fishery in the Gulf of Alaska most recently (fiscal year 1973-76) was approximately $73,100 per year (2.0 percent of State-wide revenue). Including the halibut fishery, State revenue from the groundfish fishery was approximately $267,500 per year (7.3 percent of State-wide revenue).

4.0 Biological descriptors.

4.1 Distributional and life history features.

4.1.1 Distributional features.

The distribution and abundance of the major groundfish species of the Gulf of Alaska lie mainly in continental shelf and upper slope waters, i.e., from inshore waters to bottom depths of 500 m (Table 57). Exceptions are sablefish and the deep water stocks of rattails and idiot rockfish. Although sablefish, particularly juveniles, are found in Continental Shelf waters, the adult population is centered at slope depths of 275 to 500 m, with some important sablefish stocks also found in the inside waters of southeastern Alaska. Rattails and idiot rockfish are important components of the groundfish community of the lower slope region (400-900 m). A small amount of rattails has been taken by Soviet fishery vessels in some years. Idiot rockfish probably comprise a very small part of the bycatch in the foreign trawl fisheries.

The seasonal movements of groundfish in the Gulf of Alaska are not yet known in any great detail. Along shore or coastwise movements of most groundfish are probably of short range with known exceptions being for Pacific halibut and sablefish and possibly for Pacific ocean perch. Tagging studies have indicated some long migrations of Pacific halibut and sablefish, but these movements are probably not seasonal. Pacific ocean perch apparently migrate in the winter from the Unimak-Chirikof areas eastward to Kodiak-Yakutat areas for spawning and return for feeding by early fall (August-September) to areas south of Unimak, Lyubimova (1963, 1965).

Seasonal bathymetric movements are a common feature of most and possibly all major groundfish species of the Gulf. Typically, there is a movement to deep water in the winter and return movement to shallower depths by summer. For most species the depth change may not be very great.

Table 57.-- Life history characteristics of principal groundfish species in the Gulf of Alaska[1/]

Life history characteristics	SPECIES								
	Pollock	Cod	Sablefish	Ocean perch	Halibut	Turbot	Flathead sole	Rock sole	Atka mackerel
Bottom depths of common occurrence (fath.)	30-200	10-150	50-450	50-250	10-250	30-300	30-200	10-100	Coastal and open sea
Depths of high availability by season (fath.)	100-200 (winter)	50-150 (winter)	? (winter)	150-250 (winter)	50-225 (winter)	200 + (winter)	100-200 (winter)	20-100 (winter)	offshore (winter)
	50-150 (summer)	less than 100 (summer)	150-450 (summer)	80-150 (summer)	10-100 (summer)	50-200 (summer)	50-150 (summer)	20-50 (summer)	inshore (summer)
Spawning period	March to June	Jan. to March	Dec. to April	March to June	Nov. to March	Dec. to Feb.	March to June	March to June	June to Sept.
Maximum age	17 years	12 years?	20 years?	30 years	42 years	22 years	21 years	16 years	?
Average age at maturity (female)	3 years	3 years	7 years	8 years	12 years	8 years	6 years	4-5 years	3-4 years
Average size at maturity (female)	30 cm	55 cm	71 cm	28 cm	125 cm	51 cm	29 cm	32 cm	33-35 cm
Instantaneous natural mortality rate, M	0.43	0.6	0.22	0.19	0.17	?	?	0.26	?
Growth completion rate, K (female)	0.27	0.67	0.14[2/]	0.11	0.27	?	0.11	0.15	?
Fecundity at average size at maturity	100,000	800,000	400,000	10,000	600,000	?	50,000	200,000	9,000

1/ Values and time periods given in this table are approximations.

2/ Sexes combined.

4.1.2. Life history features.

Most of the principal groundfish species spawn either in the winter or early spring. Cod, sablefish, and the large flounders, Pacific halibut and turbot, spawn during the winter months in deep water. Most other groundfish species reproduce during the spring (March–June). Atka mackerel is a summer spawner.

The principal groundfish species can be placed into three groups based on their reproduction. Cod, rock sole, and Atka mackerel lay adhesive demersal eggs. Pollock, sablefish, and most flatfish have pelagic eggs. Pacific ocean perch has internal fertilization and release pelagic larvae.

There is considerable variation between species in the amount of eggs or young produced (Table 57). Upon reaching maturity, cod may release some 600,000 eggs. Halibut and sablefish are also highly fecund. Pacific ocean perch and Atka mackerel are the least fecund of the groundfish group. Fecundity of all species is generally directly related to size of the female, a characteristic which, among vertebrates, is unique.

Among the principal groundfish species are the long-lived fishes which reach sexual maturity late in life, such as the Pacific ocean perch and the large flounders, Pacific halibut and turbot. Mortality due to natural causes is relatively low in these species. Pacific ocean perch is one of the slowest growing of the groundfish species. In contrast, pollock, cod, and Atka mackerel are short-lived and mature at an early age (3–4). Both pollock and cod have high natural mortality and growth rates. Sablefish, flathead sole, and rock sole mature at ages intermediate to those species groups mentioned above. Average age at maturity is estimated to be 7 years for sablefish, 4–5 years for rock sole, and 6 years for flathead sole.

4.2 Stock units.

Although the evidence is incomplete, most groundfish in the Gulf of Alaska can be viewed as being permanent residents. Some Pacific halibut have been observed to migrate long distances along the coasts of the United States and Canada in and out of the Bering Sea; yet, for management purposes a line is drawn at Cape Spencer by the International Pacific Halibut Commission to differentiate a northern or western stock (Area 3) from a southern or eastern stock (Area 2). Tagging studies have shown some interchange of sablefish between the Bering Sea and eastern North Pacific Ocean. These studies suggest, however, that exchange of sablefish between areas is slow and that the majority of sablefish do not migrate over great distances (Low, 1976). It is reasonable, therefore, to consider that they form entities within these major ocean basins which probably should be managed as separate units.

The Gulf of Alaska Pacific ocean perch stock is considered to be separate from those of the eastern Bering Sea, Aleutian, and British Columbia-California stocks (Chikuni, 1975; Westrheim, 1970). Within the Gulf, ocean perch may exist in several subpopulations. There is no commonality in year class strengths between the eastern Bering Sea pollock and those of the Gulf of Alaska, which suggests little or no exchange of fish between these regions.

4.3 Catch and effort.

4.3.1 United States.

The basic data on the domestic groundfish fisheries of the Gulf of Alaska consist of vessel landings by species and groups with date of landing and the State of Alaska statistical area where the fish were caught. In addition vessels licensed by IPHC to fish halibut must provide a daily record of where each set took place, the spacing of the hooks along the groundline, the kinds of bait used, and catch and effort. The State of Alaska summarizes these basic data with inputs from IPHC and reports the annual catch in their Statistical Leaflet series[1] by two broad regions of the Gulf—*Southeastern* from the border of British Columbia to 144° west long. and *Central* from 144° west long. to Unimak Pass in the western Gulf. The series also provides a subdivision of the halibut catch by nation (U.S. and Canada) and by IPHC statistical areas. An IPHC report (in press) summarizes catch and effort statistics of the halibut fishing for the period 1929-76.

The domestic catch data are also reported in the Statistical Yearbook of the International North Pacific Fisheries Commission (INPFC), but by INPFC statistical areas and by gear type.

They also reported in annual reports of the Pacific Marine Fisheries Commission (PMFC) by PMFC statistical units identical to those of INPFC.

4.3.2 Canada.

Canadian catch of principal groundfish by species including halibut and effort by gear type are reported in the Statistical Yearbook of the INPFC.

They are also reported in annual reports of the Pacific Marine Fisheries Commission (PMFC) by PMFC statistical units identical to those of INPFC, and in Technical Reports of the Fisheries Research Board of Canada by more precise areas.

4.3.3 Japan.

Since 1964 Japan has provided to the U.S., through INPFC, statistics on its Gulf of Alaska groundfish fisheries. This has been done on an annual basins, and the statistics consist of catch, effort, and size composition reported by statistical blocks of ½° latitude and 1° longitude, by month, by gear type, and by vessel size (tonnage). Catch is in metric tons and is given for the following species and species groups: turbot, other flatfishes, Pacific ocean perch, orange rockfish, other rockfish, sablefish, Pacific cod, pollock, other fishes and total catch.

Fishing effort is given in number of hours for their trawl fisheries and in 10 hachi units for their longline fisher (hachi is a basket of longline; each longline being about 75 meters in length on which 38–40 branchlines with hooks are attached at regular intervals).

4.3.4 U.S.S.R.

U.S.S.R. began providing statistics on their trawl fisheries in 1967 but only in terms of the broad area of the Gulf of Alaska. Catch was reported only for rockfish and "others." By 1973 their statistics were being given by INPFC areas, by month, by two general vessel classes (stern trawlers and side trawlers), by the following species and species groups:

Pacific ocean perch, other rockfish, Pacific halibut, Arrowtooth flounder (turbot), Greenland turbot, other flounders, Pollock, Cod, Sablefish, Atka mackerel, and misc. species.

In most recent years (1974 and 1975) effort has been reported by four units: number of hours trawled, number of trawl sets, number of days fished, and number of days on the grounds.

U.S.S.R. has reported no information on size of fish taken in their fisheries.

4.3.5 Republic of Korea (ROK).

Prior to 1975 only scant catch data, based on small samples of the commercial fleet, were available from the ROK.

Recently, data in the INPFC format have been reported by ROK for its setline, trap, and trawl fisheries during 1975 and the first half of 1976.

Longline and trap fisheries catch and effort data are given by month and by tonnage class for the northeastern Pacific as a whole. There is a further breakdown of the catch and effort by statistical blocks (½° lat by 1° long) but by quarter rather than month and with no indication of tonnage class of vessels. Effort is expressed in number of operating vessels, operating days, and hooks or traps. Catch is reported for sablefish, Pacific ocean perch, and "others".

ROK trawl catch and effort data (number of operating days and hauls) are given by ½° lat and 1° long blocks on a monthly basis. Catch is reported by the following groundfish species and groups:

Pacific ocean perch, Halibuts, Flatfishes, Pollock, Cod, and Sablefish.

ROK has reported some information onthe size of fish taken in their fisheries, but samples were so small and were from such a broad area that they have little utility in status of stock or fishery impact analyses.

4.3.6 Poland.

After an exploratory cruise in the Gulf of Alaska in 1973 Poland began commercial operations in this region in 1974 and reported small catches of groundfish. Their 1975 statistics are more detailed that those for 1973 and 1974 with catch and effort (number of hours trawled) reported by both INPFC areas and ½° lat x 1° long blocks, by month, and vessel class. Catch is listed by species.

Poland has provided no information on the size of the fish taken in their Gulf of Alaska operations.

4.4 Research survey and sampling data.

Resource survey data on Gulf of Alaska groundfish can be placed in four categories: Trawl survey data, hydroacoustical survey data, biological data collected from the fishery, and itchyoplankton survey data. The most extensive set of data in terms of geographical and time coverage are those derived from research bottom trawl surveys and, in particular those surveys conducted by NMFS and IPHC. Some 20 NMFS groundfish surveys were conducted at various periods over the past 25 years (1953-1977) in Continental Shelf and inside waters of the Gulf of Alaska. Sampling was done in a standardized manner using commercial type bottom trawls. The following types of information were routinely collected: Kinds and amounts of groundfish caught; catch rates by species and species groups; and, biological data (size, age maturity, and individual weights) concerning the major species that were encountered. From this information estimates have been derived of biomass, age and size composition, relative strength of year classes, age and size at maturity, fecundity, mortality, growth rates, size of fish related to weight of fish, and seasonal and long term changes in resource availability by depth and area. A log book providing the location, date, depth, and catch composition at each trawl station for each survey has been compiled (NMFS, 1969) and periodically updated.

IPHC has trawl survey data that dates back to its Gulf-wide and seasonal surveys

[1] Alaska Catch and Production Commercial Fisheries Statistics, State of Alaska, Department of Fish and Game.

of groundfish during 1961–1963. Data, by station, consist of catch by weight of species and in some instances size composition of dominant species in the catch. IPHC also has catch and biological information by station from its annual trawl surveys of juvenile halibut which cover the years 1967 to the present.

Catch and biological information are also available from Canadian research trawl surveys of Pacific ocean perch and other groundfish in the Gulf in 1961 to 1963 and in 1970.

Japan Fishery Agency (1971, 1972, 1974) provides catch and size data by station from Japanese trawl surveys in the western Gulf of Alaska in 1970 to 1972. Results from more recent surveys will be available in the future.

U.S.S.R. trawl survey data are rarely made available. Reports by U.S.S.R. on its research surveys contain results but provide very little specific station data (e.g. Lyubimova, 1961, 1963, 1964; Serobaba, 1976).

Several hydroacoustical surveys of groundfish have been carried out by U.S.S.R. and Canadian research vessels. The availability of the basic acoustical data is not known, although the general results have been reported (Westrheim, 1970; Serobaba, 1976).

Tagging data have been accumulated from studies directed principally on Pacific halibut and sablefish in order to understand the movements and stock structure of these species. Both Japan and IPHC have considerable data on the tagging and tag returns of halibut. Tagging studies on sablefish date back to the 1950's (Pruter, 1959), but at that time tagging was restricted to waters off Washington, Oregon, and California; some of those tagged fish were, however, recovered in the Gulf of Alaska. In 1971 NMFS initiated a cooperative sablefish tagging program in which the states of California and Oregon, the Pacific fisheries research arm of the U.S.S.R. (TINRO), and the Republic of Korea participated. The Northwest and Alaska Fisheries Center maintains a file of all tagging and tag return data pertaining to this program. Japan has also been active in the tagging of sablefish.

Sampling of the fisheries catch for biological information on principal groundfish has been done by Japan, IPHC, and the U.S. (NMFS). The data from Japan consists primarily of size composition and have been made available to U.S. scientists, through INPFC, since 1964. Japanese researchers also collect data on the age of specific groundfish species, such as Pacific ocean perch. IPHC observers have collected data on the size of and age of halibut in the North American setline fishery.

From 1964–69, U.S. observers were allowed to gather data on the incidence of halibut in the Japanese trawl fisheries of the Gulf. In the 1970's, the NMFS began an observer program in which U.S. researchers were placed onboard foreign vessels to collect information on the incidence of halibut and crab and biological and catch data on other groundfish. These data are compiled and readily accessible at the Northwest and Alaska Fisheries Center in Seattle.

Ichthyoplankton surveys have been conducted in the Gulf by NMFS, Japan, and U.S.S.R. The availability of the data from foreign surveys is not known.

4.5 Other (habitat).

The geomorphology of the eastern and western sides of the Gulf of Alaska varies markedly. The bottom topography in the eastern side of the Gulf of Alaska rises gently from 5,000 to 2,000 m, but sharply from 2,000 m to the edge of the Continental Shelf at 200 m; whereas, along the western side of the Gulf the bottom topography rises sharply directly from the bottom of the eastern end of the Aleutian Trench, at depths of 5,000 m, or more to the shelf edge. Further, although the general extent of the Continental Shelf is approximately 100–150 km and numerous troughs normal to the coast occur, islands and coastal embayments provide diverse environments. Northward of the winding channels of the Alexander Archipelago, seaward of which the shelf extends only 20–30 km, the shelf broadens to over 100 km from the coast. The extensive embayments of Prince William Sound and Cook Inlet increase with width on the shelf from 200 km to over 300 km at the northern and western side of the Gulf, respectively. Also at the western side of the Gulf, the Kodiak-Afognak island group separates the deep Shelikof Strait area along the Alaska Peninsula from the broad (100 km) shelf area to the east of the island group. General sediment types also vary: coarse clastics in the Alexander Archipelago; glacial fines, particularly from the Copper River, at the head of the Gulf; sands in Cook Inlet area; and, pebbly, gravelly sand, shell fragments and volcanics near Kodiak.

Circulation in the Gulf is cyclonic (counterclockwise) and locally wind-driven; thus, it is accelerated in winter as a result of the presence of the Aleutian low pressure system. Maximum velocities occur at the shelf break and speeds up to 100cm/sec (2 knots) occur at the surface in the western side of the Gulf. Although the cyclonic circulation at the edge of the Continental Shelf is subject to perturbations, the net flow is relatively constant because variable stresses are buffered within a large water column. However, in the coastal regime, bottom friction, tidal flow, and shallow depths result in a more complex less organized flow regime and numerous eddies, some of which may be of a quasi-permanent nature.

Winter intensification of winds that accelerates cyclonic flow also piles up water along the coast, and a compensatory flow of cold inshore surface water moves seaward at the bottom over the shelf. In spring, windstress is reduced and there is a net seaward flow at the surface that is accelerated by seaward discharges of snowmelt and river runoff; both phenomena result in extensive dilution of coastal waters in late spring and summer.

Although flow around the Gulf if cyclonic (anti-clockwise) and northward flow into the area brings unseasonably warm water along the coast from the southeast and from the oceanic regime from the southwest, water temperatures are largely dominated by seasonal effects. Winter overturn extends to depths of 100 m or more, resulting in extremely variable conditions in inshore areas where coastal surface temperatures can vary from 0° or lower (depending on whether ice forms in winter) to approximately 12–15°C. Although the range of temperatures obviously decreases with depth, near the edge of the Continental Shelf a nearly constant temperature regime of 4–5°C occurs year round. Although this regime could influence spawning and feeding movements as well as guide extensive migrations such relations have not been investigated.

Highly productive areas must have a constant source of chemical nutrients which permits an extensive primary production of algae, which constitutes the base of the marine food web and governs the fate of all organisms higher in the food web. Nutrient replenishment to the surface layer occurs year round (although it is intensified in winter) in the central portion of the Gulf of Alaska gyre and at no time are the primary nutrients (phosphate, silicate, and nitrate) totally consumed, as they are in many other areas of the world's oceans. Thus, a very rich and abundant plankton community exists in the area, subject of course to natural biological cycles.

4.6 Quality of data.

4.6.1 Fisheries data.

Fisheries data should essentially include the catch by species and the quality and quantity of effective effort expended to take this catch; they should be provided for relatively precise geographical areas and time periods. In this way trends in catch and standardized catch-per-unit of effort (CPUE) can be monitored by precise time and area units and reliable inferences drawn concerning stock abundance. In addition, data on size and age of fish should be adequate to estimate size and age composition of the catch, by time and area. These basic fisheries data (catch, effective effort, age and size composition) provide much of the input for determining mortality rates, relative year class strength, changes in stock density, recruitment, and other population characteristics upon which the condition of stocks can be measured.

Japan provides very detailed statistics on her fisheries (see Section 4.3), but even these statistics are deficient in terms of fishing effort, age and size data, and completeness in reporting catches by species. The fishing power of the Japanese fleet has increased because of increases in vessel horsepower, improvements in fish detecting and harvesting gears, and experience acquired by the fishermen of the grounds. It may be extremely difficult and perhaps impossible to adjust the reported or nominal effort to reflect all these factors affecting fishing power. There is also the problem of determining what proportion of the total fishing effort was expended on each major species. Chikuni (1975) and Larkins (1974) addressed the problem of effective fishing effort on Pacific ocean perch, using quite different approaches (see Section 4.7.2).

Until recent years data on size composition of the principal species harvested by Japan were insufficient because of a lack of areal and seasonal coverage. No associated age data have accompanied the size information from Japan's fisheries or at least these data have not become available to U.S. investigators. There also remains a significant amount of Japan's groundfish catch consisting of unidentified species. In 1975 the unidentified catch amounted to 5,400 mt or 7 percent of Japan's total Gulf of Alaska groundfish catch.

The U.S.S.R. has had a very poor history of reporting on her fisheries of the Gulf of Alaska. During the years (1962–1967) when the Soviet fisheries dominated the Pacific ocean perch fisheries of the Gulf, and when their annual catches of this species often exceeded 150,000 mt, there was no record of fishing effort. There was also no breakdown of the catch by area nor were there any data on the age and size composition of the catch.

In 1973 U.S.S.R. began providing catch and effort statistics by major statistics areas with a further breakdown by month

But the same deficiencies as mentioned for the Japanese statistics apply to those of the U.S.S.R.—no means of adjusting their reported effort to effective effort, no way of relating catch of species to the effort expended to obtain that catch, inadequacy of age and size data, and the large amount of the Soviet catch reported as miscellaneous, i.e., unidentified species. In 1975 the catch of miscellaneous species amounted to 7,300 mt.

Because of the U.S. observer program more complete data on the species composition of catches and the age and size composition of major species are now being obtained from the Soviet and Japanese fisheries.

In the U.S. domestic fisheries the problem of the unrecorded and unidentified catch of bait fish as described in Section 3.2.1 needs to be resolved, as does the potential problem of unreported discards at sea of unwanted species or sizes.

4.6.2 Data from research vessel surveys.

In contrast to commercial fishery data, research vessel surveys provide an independent and less biased means of estimating the condition of groundfish stocks. The surveys are conducted in such a manner that estimates of age and size composition and other population characteristics can be obtained for the stock as a whole, whereas the fisheries may be concentrating on certain species or size of fish and in specific areas, and the data from such a fishery would reflect this bias. Since surveys can be done in a standardized manner CPUE from the surveys can be more meaningful than that from the fisheries for examining density changes by time and area. Furthermore, surveys of juvenile or prerecruit fish can best be done by means of research surveys, and such surveys are one of the few means by which predictions of incoming year class strengths can be obtained. There is also the relatively new approach of assessing stock size by acoustical sounding.

The deficiencies in existing survey data are: (1) lack or absence of estimates of the age and size composition of groundfish populations, excepting Pacific halibut prior to 1972. Some age and size data were collected in early surveys but, because of the lack of geographical coverage and the method of sampling, they cannot be used to estimate the size and age composition of populations. Beginning in 1972 NMFS sampling procedures were introduced to provide these estimates for pollock and other major populations; (2) insufficient assessment data on deep water stocks such as Pacific ocean perch and sablefish. Resource assessment surveys by NMFS Adequately covered most populations of the Continental Shelf, but relatively little sampling occurred in deeper water along the upper slope (150 to 450 fathoms) where perch, sablefish, and other groundfish populations sometimes concentrate. Canadian researchers (Westrheim, 1970) using the vessel, *G. B. Reed*, made extensive surveys of the ocean perch in the Gulf of Alaska in 1961–63 but because of the inability to trawl in rocky areas where perch also exist and because a certain unknown proportion of the perch are off the sea bottom and inaccessible to bottom trawling, the Canadians did not attempt to estimate the biomass of perch. NMFS is planning a two-prong approach of bottom trawling and acoustically assessing the perch and other rockfish of the Gulf in 1978. There is also the need to estimate the biomass and age composition of sablefish and deep water stocks of other groundfish of the Gulf of Alaska; (3) no assessment data on Atka mackerel. Although Soviet scientists have estimated the population size of this important resource in the western Gulf, a description of their methods and basic data have not been made available to U.S. biologists. No surveys of Atka mackerel have been done by the U.S.

4.6.3 Data to differentiate stocks.

Very little data of substance are available to separate the various stocks of Pacific ocean perch, sablefish, and other groundfish species of the Gulf of Alaska. Tagging and biochemical studies are two currently acceptable means of identifying subpopulations. Tagging studies require (1) the ability to capture viable fish for tagging, (2) strategic tagging of fish by area and time, (3) an extensive and intensive fishery to recover the tagged fish, and (4) fish which will retain the tag and will not suffer inordinate mortality from the tagging procedures or the tag. Tagging studies have been directed towards sablefish and Pacific halibut, but there may be a question as to whether tagging of these species has been strategically done in all instances; these fish apparently suffer no serious effects from being tagged. As for the third requirement, the sablefish fishery is extensive and intensive, and tagging results have indicated very little movement of adult fish between areas. With halibut, even though both the fishery and tagging efforts have occurred throughout the northeastern Pacific and eastern Bering Sea, tagging studies to differentiate stocks have not been conclusive.

Genetic separation of stocks through biochemical analyses appear promising and some limited studies have been done to differentiate subpopulations of Pacific ocean perch and other rockfish species (Johnson, et al, 1971; Tsuyuki, et al, 1968). Biochemical studies have the advantage that separation of stocks can be more precise than that obtained by tagging and other approaches.

4.6.4 Data on ecosystem.

Very little data are available concerning the interaction among groundfish populations, with the physical and biotic environment, or with the fisheries and other activities of man. Some environmental data (temperature and bottom type) have been gathered and associated with catches of certain species. Some analyses of stomach contents of major species have been done to better understand predator-prey relationships, but no tropho-dynamic scheme of energy flows between groundfish and other components in the ecosystem has been proposed. Research surveys may disclose long-term changes in population size, like the decrease in ocean perch and the corresponding increase in pollock over the past 10 to 15 years, but there are no data to determine whether the two events are related (i.e., that with the reduction of perch by the fisheries, the pollock benefited by increased food supplies). There is also a lack of data to explain and predict changes in year class strength or changes of distribution.

4.7 Current status of stocks.

By definition, maximum sustainable yield (MSY) is the largest average catch which can be taken from a stock over a reasonable period of years under current environmental conditions. This assumes an equilibrium in the population associated with a degree of stability in the environment during the time period considered. Even for such a time period neither the environment nor the dynamics of the population can be expected to be constant from year to year. The concept of MSY, therefore, is more applicable to longer-lived species in which variations in biomass are buffered by the presence of many year classes. Any long term stability in survival and recruitment even in these populations is probably exceptional. As a general rule, therefore, MSY cannot be directly applied as a goal or criterion for fisheries management without proper evaluation of real time indices of stock condition, such as current CPUE and age structure. In some instances, current environmental conditions may constrain population growth at levels far below historic levels of MSY. Under these circumstances the population can be considered to be approaching a lower level of equilibrium which may permit only a correspondingly low level of harvest. At this level and with current environmental constraints even the most drastic of management measures may not restore a stock to its former level or productivity. The present state of the science is inadequate to predict the capacity of environment for the production of fishery resources, ascertain with any certainty whether the depletion was a consequence of natural factors or overfishing, or to predict with confidence the consequences of remedial management action. The complicated interaction processes associated with the productivity of marine fish populations are not very well understood and even such fundamental assumptions as the association between stock size and recruitment strength which are implicit in manipulation of harvest to achieve MSY have not been verified or quantified. In fact, it is generally recognized by fisheries scientists that the existing theories and models pertaining to fishery resources management suffer some fundamental inadequacies, and concepts and theories must be developed to answer present and future management demands. Until such new concepts supercede the old, the latter can still serve as a useful basis for deriving management decisions, providing their limitations and underlying assumptions are recognized and evaluated with the best available information as required by Pub. L. 94-265. This is the philosophy and approach used throughout this plan.

In the case of stocks which are in virgin or near-virgin states, MSY may be estimated using the equation developed by Alverson and Pereyra (1969) and modified by Gulland (1969):

$$MSY = a\,M\,B_o$$

where

a=constant=0.4 (per Gulland; Alverson & Pereyra used 0.5)

M=instantaneous natural mortality rate

B_o = virgin biomass.

For pollock, Pacific cod, and flounder (except Pacific halibut) stocks in the Gulf of Alaska which have been relatively lightly fished, the Gulland (1969) procedure of estimating MSY was used. For Pacific ocean perch and sablefish, a large body of catch-effort information exists, and therefore MSY was estimated by the general production model (Schaefer 1954, Pella and Tomlinson 1969). For Pacific halibut, the International Pacific Halibut Commission has used a variety of techniques to estimate MSY including the Beverton and Holt (1957) model, since there is a good historical record of the fishery and an extensive research program. For stocks such as Atka mackerel and other species about which there is very little information, MSY levels

were derived empirically from whatever information was available.

In contrast to MSY, equilibrium yield (EY) is based on the best estimates of the current condition of stocks. It is the annual or seasonal harvest which theoretically will maintain a specific stock at approximately the same level of current abundance (apart from the effects of environmental variation) in succeeding seasons or years. In both under- and over-exploited stocks, EY is less than MSY. When, on the basis of CPUE trends, survey data or other information there is reason to believe that the abundance of a stock is below that required to produce MSY, EY is then the maximum production that can be sustained under current population conditions. To rebuild such stocks to more productive levels, the annual or seasonal catch level would have to be set below EY.

Estimates of MSY and EY or each groundfish species for species-group described below are shown in Table 58.

Table 58--The derivation of Optimum Yield (OY) for Gulf of Alaska groundfish resources. 1,000's mt.

	Species	Shumagin	Chirikof	Kodiak	Yakutat	Southeast	TOTAL
Exploitable biomass	Pollock	357-713	340-680	355-511	78-155	25-51	1055-2110
	Cod	40-79	17-33	64-128	18-36	5.9-12	145-288
	Flounders	220	69	277	15+	32	772
	POP			-Unknown-			
	Rockfish			-Unknown-			
	Sablefish			-Unknown-			
	Atka mack.						(110)1/
	Squid						
MSY	Pollock						169-338
	Cod						34.8-69.2
	Flounders						67
	POP						125-150
	Rockfish						7.5-10
	Sablefish						22-25
	Atka mack.						(33)1/
	Squid						2.0
EY (When stock incapable of producing MSY)	Pollock						N/A
	Cod						N/A
	Flounders						N/A
	POP						50
	Rockfish						N/A
	Sablefish						17.4-19.8
	Atka mack.						N/A
	Squid						2.0
ABC	Pollock 2/	57.0	54.4	40.8	22.5	4.1	168.8
	Cod 2/	9.6	4.1	15.3	4.3	1.5	34.8
	Flounders 2/	20.8	5.7	23.9	12.5	4.1	67
	POP 3/	5.3	5.3	10.4	16.0	13.0	50
	Rockfish 3/	0.3	0.2	0.6	3.4	3.1	7.6
	Sablefish 3/	2.8	1.9	3.2	4.7	4.9	17.4
	Atka mack. 4/	4.4	3.6	15.8	1.0	0	24.8
	Squid 3/	0.4	0.4	0.4	0.4	0.4	2.0
	Others	4.3	3.6	5.0	2.0	1.1	16.2
OY	Pollock	57.0	54.4	40.8	22.5	4.1	168.8
	Cod	9.6	4.1	15.3	4.3	1.5	34.8
	Flounders	10.6	2.7	12.0	6.4	2.0	33.5
	POP	2.7	2.7	5.2	7.8	6.5	25.0
	Rockfish	0.3	0.2	0.6	3.4	3.1	7.6
	Sablefish	2.1	1.4	2.4	3.4	3.7	13.0
	Atka mack.	4.4	3.6	15.8	1.0	0	24.8
	Squid	0.4	0.4	0.4	0.4	0.4	2.0
	Others	4.4	3.6	5.0	2.0	1.1	16.2
	TOTAL	91.3	73.1	97.5	51.4	22.4	335.7

1/ From unsubstantiated report of Soviet scientists.
2/ Apportioned on basis of trawl survey data.
3/ Apportioned on basis of '73-'75 Japanese catch.
4/ Apportioned on basis of '73-'75 Soviet catch.
5/ Apportioned equally to each area.

4.7.1 Alaska pollock.

4.7.1.1 Maximum sustainable yield (MSY).

There is reason to believe that the population of this species in the Gulf of Alaska has been increasing both in distribution and abundance. During 1972–1975, the National Marine Fisheries Service conducted resource assessment surveys in this region from which first order approximations of standing stock and potential yield have been calculated (Alton, 1976).

Using the area-swept method, and assuming the catchability coefficient (c) to be between 0.5 and 1.0, exploitable biomass was estimated to be 1.1–2.1 million mt. Assuming natural mortality (M) to be 0.4 (M for pollock in the Bering Sea has been estimated by Japanese scientists to be 0.43), and applying the Gulland equation, a provisional estimate of MSY is 169,000–338,000 mt.

4.7.1.2 Equilibrium yield (EY).

Not applicable—MSY attainable.

4.7.2 Pacific Ocean perch.

4.7.2.1 Maximum sustainable yield (MSY).

Results of a recently concluded comparison of research vessel catch rates during cruises conducted in 1961–62 (prior to the development of the large foreign trawl fisheries in the area) and cruises conducted in 1975 indicate that the perch stocks in the central Gulf of Alaska are now no more than 20 percent of their virgin abundance (Hughes, et al, 1976). If this is representative of the region as a whole, perch abundance in the Gulf of Alaska will have to increase about 2½ times its current level to establish a stock size that would produce the potential MSY, which is estimated to be about 125,000 mt in the Preliminary Fishery Management Plan for the Trawl Fishery of the Gulf of Alaska for 1977 and 150,000 mt by Chikuni (1975).

4.7.2.2 Equilibrium yield (EY).

The Gulf of Alaska perch stock was virtually unutilized prior to 1960. With the entry into the region of Japanese and Soviet distant water trawlers in the early 1960's, however, the total catch in 1963 increased to 147,000 mt, reached a maximum of about 393,000 mt in 1965 and was in excess of 150,000 mt through 1968 (Chikuni, 1975).

There is consensus among fishery scientists of the U.S., Canada, U.S.S.R., and Japan that the Pacific ocean perch stocks of this region were severely overfished by these early fisheries and the stocks are now at relatively low levels of abundance (INPFC, 1975; Anon., 1974).

Status of stock studies have been based on yield per standing biomass analyses (Chikuni, 1975) and on CPUE trends related to stock production models (Larkins, 1974). All have clearly shown downward trends since the very early years of the fishery. U.S. scientists contend that the population has probably declined to a lower level than indicated by CPUE studies because effort has not been adequately adjusted to account for unquantifiable improvements in the fishing power of Japanese trawlers. In other words, an hour of trawling now represents a great deal more fishing power than an hour's trawling in 1966 because of larger engines and nets, improved hydroacoustic equipment and techniques for locating fish, extended search time, and experience on the part of the fishermen. When CPUE is based on catch per vessel-day rather than catch per hour, the downward trend is accentuated (Larkins, 1974).

This low level of abundance has remained relatively stable in recent years, and there are no signs of any strong year classes entering the fishery. United States scientists have noted in INPFC meetings that even though a reduction in the catch of Pacific ocean perch was attained in 1974, the downward trend in stock condition, as inferred from Japanese CPUE values, continued unabated. Therefore, on the basis of relations between catch and catch rates, it is believed that EY of Pacific ocean perch in the Gulf of Alaska under current conditions of stock abundance is about 50,000 mt.

4.7.3 Other rockfish.

4.7.3.1 Maximum substainable yield (MYS).

Little is known about the "Other Rockfish" species complex except that it is much less abundant than Pacific ocean perch and small concentrations of various species occur in localized areas. For 1973 through 1975 the annual foreign catch of rockfish other than Pacific ocean perch ranged from 7,600 to 10,200 mt. There is no evidence that catches of greater magnitude can be sustained. Therefore, until such evidence is available, MSY is considered equal to the range of recent catches, 7,600–10,200 mt.

4.7.3.2 Equilibrium yield (EY).

Not applicable—MSY attainable.

4.7.4 Flounders (other than halibut).

4.7.4.1 Maximum sustainable yield (MSY).

Based on NMFS groundfish assessment surveys in 1973 through 1975, the exploitable biomass of flounders (except halibut) on the continental shelf and upper slope region (8–190 fathoms) of the Gulf of Alaska is estimated to be 772,000 mt. For individual species and species groups, exploitable biomass is estimated to be: 304,000 mt for turbot; 205,000 mt for rock sole; 108,000 mt for flathead sole; and, 155,000 mt for the remaining flounder species combined. This entire complex has been subject to little fishery pressure relative to its apparent potential yield. MSY, using Gulland's (1969) equation and an estimate of instantaneous natural mortality rate of 0.2, except for rock sole (0.26), are: Turbot 24,300 mt; rock sole 21,300 mt; flathead sole 8,600 mt; and, other flounders combined 12,400 mt. For the flounder group as a whole (excluding halibut) the MSY is estimated to be 67,000 mt.

4.7.4.2 Equilibrium yield (EY).

Although MSY's for some flounder species have been estimated, it is more appropriate at this stage to manage the flounder resources as a group rather than by individual species. With present knowledge, it is assumed that any flounder fishery in the Gulf of Alaska will simultaneously capture a number of species and stocks, each of which will be fished at a different rate. Until geographical and seasonal patterns and rates of fishing on these individual flounder stocks become better known, EY will be considered only for the flounders as a group. Since this group has been only lightly exploited, MSY is attainable.

4.7.5 Pacific halibut.

4.7.5.1 Maximum sustainable yield (MSY).

Chapman, Myhre, and Southward (1962) estimated the MSY of Pacific halibut at 19,400 mt (14,550 mt dressed weight) in IPHC Area 2 (Southeastern-Vancouver) and 21,800 mt (16,350 mt dressed weight) in IPHC Area 3 (Shumagin-Yakutat), or 41,200 mt for the entire northeastern Pacific Ocean.

4.7.5.2 Equilibrium yield (EY).

After reaching a peak in the late 1950's and early 1960's, halibut stocks have declined sharply and are at a level of about a third of that required to produce MSY. The North American halibut fishery has been severely restricted in an attempt to improve stock abundance, but reductions in the domestic catch limit were partially offset by the increased incidental catch by foreign trawl fleets. Unfavorable natural conditions may have also contributed to the declined of the halibut stocks.

The International Pacific Halibut Commission now estimates EY for halibut at about 12,000 mt (9,000 mt dressed weight) for the entire northeast Pacific: 6,000 mt (4,500 mt dressed weight) in IPHC Area 2 (includes British Columbia) and an equal amount in IPHC Area 3.

4.7.6 Sablefish.

4.7.6.1 Maximum sustainable yield (MSY).

Applying the general production model (Fella and Tomlinson, 1969) the MSY for sablefish stocks in the Gulf of Alaska is estimated to be 22,000–25,000 mt (Low, 1976). The upper limit of this range was exceeded in 1972 and 1973; with the development of an ROK longline fishery in 1975 and 1976, MSY was probably exceeded in those years as well.

4.7.6.2 Equilibrium yield (EY).

After several years of relative stability in catch per skate, this standard measure of CPUE declined during the early 1970's in all areas of the Gulf of Alaska—Gulf-wide, the decline was about 30 percent from 1970 to 1975. Although this indicator increased 12 percent from 1975 to 1976, it was still 21 percent below the 1970 value.

If by 1970 (after seven years of development in this fishery, with total removals in excess of 55,000 mt) Gulf of Alaska sablefish were near the abundance level which would produce MSY, then on the basis of catch per skate data maximum equilibrium yield in 1976 was 21 percent below MSY, or 17,400–19,800 mt. Considering, however, the increasing experience of foreign fishermen and technological improvements in gear and vessels (e.g. hook size and spacing, bait, soak time, positioning equipment) catch per skate is likely to decline more slowly than stock abundance. In fact, catch per boat-day (based on reported catch and U.S. surveillance observations), apparently decline 50 percent from 1971 to 1976. Differences in the magnitude of decline in these two CPUE values are not currently reconcilable.

The fact that a unit of longline gear has relatively small catch potential before it is saturated introduces another possible source of bias when using its CPUE to estimate abundace trends. In this situation, abundance could decrease for some time before it reaches the gear saturation threshold and begins to affect CPUE.

Therefore, the 17,400–19,800 mt estimate of EY based on catch per skate must be viewed as optimistic and qualifed with catch per boat-day and gear saturation factors.

4.7.7 Pacific cod.

4.7.7.1 Maximum sustainable yield (MSY).

Prior to mid-1977, insufficient data and analysis were available for estimating abundance or sustained yield. Accordingly, the TAC for cod contained in the PMP for 1977 was based only on past catches. New data from and analyses based on NMFS resources assessment surveys indicates a much larger abundance and potential yield than previously thought. Recent catch levels have only been a small fraction of MSY and information shows evidence of a biomass

that could support substantially higher catches.

Therefore, on the basis of recent survey data (Table 58) and assuming that natural mortality (M) is 0.6, the MSY of Pacific cod is estimated by the Gulland (1969) equation to be 34,800 to 69,120 mt. Information concerning this species in other regions indicates that large natural fluctuations in recruitment (hence abundance) might be expected.

4.7.7.2 Equilibrium yield (EY).

Not applicable—MSY attainable.

4.7.8 Atka mackerel.

4.7.8.1 Maximum sustainable yield (MSY).

Soviet hydroacoustic surveys in the Aleutian area in recent years found eight concentrations of Atka mackerel with an estimated biomass of 110,000 mt. Trawl surveys indicate at least as large a biomass in the Gulf of Alaska. The predominant sizes of fish available to trawls were greater than 30 cm, which are mature fish older than 3–4 years. On the basis of analyses of biological characteristics, Soviet scientists believe that 30 percent of the adult stock can safely be harvested. Accordingly (and tentatively), MSY for Atka mackerel in the Gulf of Alaska is set at 33,000 mt.

4.7.8.2 Equilibrium yield (EY).

Not applicable—MSY attainable.

4.7.9 Squid.

4.7.9.1 Maximum sustainable yield (MSY).

Although no published documentation or current research findings dealing with squid abundance or potential yield are available, incidental catches by commercial fishing and research vessels, and the incidence of squid in the stomachs of fish and marine mammals indicate a large standing stock. MSY is intuitively believed to be greater than 2,000 mt.

4.7.9.2 Equilibrium yield (EY).

Not applicable—MSY attainable.

4.7.10 Other species—MSY=16,200 mt.

Very little is known about the distribution and abundance of the species of fish referred to as "other species." However, based on the best scientific evidence available derived from past performances of foreign fishing vessels, the MSY for "other species" is estimated at 16,200 mt.

4.8 Estimate of future stock conditions.

With the exception of Pacific ocean perch, Pacific halibut, and sablefish all other groundfish species in the Gulf of Alaska are believed to be at levels of abundance equal to or greater than those that would produce MSY. The management regime described in Section 8.0 is disigned to keep those healthy stocks somewhat above the level of abundance required for MSY, while providing sufficient relief to halibut, ocean perch, and sablefish so that their stocks can begin rebuilding.

In addition, there is no evidence of natural phenomena that could be expected to cause either serious biological or socio-economic consequences, although the possibility of undetected year class failures, declines in growth rate, or other adverse symptoms cannot be completely discounted. On the other hand, unforseen enhancements of stock condition are equally likely.

With the implementation of this plan, the short-term outlook for stock conditions is good.

In the context of longer-term concern, there is reason (mostly circumstantial) to believe that the Gulf of Alaska ecosystem has changed sugnificantly over the last decade—Pacific ocean perch, which had been the dominant groundfish form, is no longer so, but pollock and Atka mackerel populations appear to have inreased greatly in abundance and in distribution. If there is a relationship between these trends (and such a relationship is only conjectural at this point) the strictest of measures may not result in a resurgence of perch abundance, or, if they do it may be at the expense of pollock, cod or other species.

In summary, it is clear that the groundfish complex has not been stable over the recent past and the combination of increased exploitation (although confined to individual species' OY's) and the unpredictable vagaries of environment may result in a subtle but continuing period of instability.

4.9 Future research needs.

Refinement of abundance estimates and biological attributes are necessary for all species, as is the need to determine stock composition. Research activity information and analyses of fishery performance (as indicated by the fisheries statistics required by Section 8.5) which will give continual updates of the biological data bases and the fishery, should satisfy most of these needs. A special effort is needed, however, to assess the sablefish population and stocks of other deep-water species not covered in past or planned research survey. A special survey of the rockfish community (scheduled for 1977) and Soviet research data concerning Atka mackerel (if made available for evaluation by U.S. scientists) should satisfy immediate management needs for these species.

A very critical area of research is that of defining the time-space associations between halibut and other groundfish species. Until precise halibut/other groundfish distribution patterns are known, full utilization of the groundfish complex may, through incidental trawl catch mortality, lead to even further deterioration in the halibut population. The on-going program of placing observers on foreign trawlers, along with a proposed program of at-sea sompling of the domestic trawl fishery, should provide a substantial body of information bearing on this problem. Integration of that information with data from past and future resource survey cruises hopefully will lead to development of a management strategy that will maximize the potential for achieving optimum yields for most species while reducing to an acceptable level incidental halibut mortality. However, should this study show that halibut protection and near-achievement of optimum yields of other groundfishes are mutually exclusive, a bioeconomic evaluation of the consequences of favoring halibut protection or other groundfish production should commence immediately and be far enough along by mid-1978 to provide definitive input to the 1979 fishery management plan.

5.0 Catch and capacity descriptors.

5.1 Foreign.

There is a need for indices to measure and monitor the harvest efficiencies of foreign and domestic fisheries. Besides their potential use in evaluating fleet capacities and optimum yields, such indices would be helpful in planning adequate levels of U.S. surveillance and observer efforts because they would permit estimating ahead of time the number of vessel days and man days which would need to be expended by a foreign nation to obtain its allowable catch. In this regard, they could provide a check on the reasonableness of the number of vessel permits requested by foreign nations. They could also serve as indicators of year-to-year changes in stock density, to supplement more traditionally used measures such as the catch-per-hour of trawling.

A preliminary analysis has been made by NMFS of some efficiency aspects of the foreign fisheries occurring off Alaska. The data used in the analysis has been gleaned from many sources because most are not now regularly reported directly by foreign nations. The derived indices of efficiency should be viewed only as precursors of what will be obtained when more complete and accurate statistics are provided to the U.S. by foreign nations. The catches used in the analysis are from official reports provided to the U.S. by Japan and the U.S.S.R. However, they have been pooled for all waters off Alaska (Bering Sea, Aleutians, and Gulf of Alaska), to compensate for known and suspected errors in reporting of catches between areas. The number of vessel days are from observations by NMFS law enforcement personnel. Most of the vessel sizes and crew sizes used in the analysis are from reports by NMFS observers and law enforcement personnel, plus what could be determined from a variety of published and unpublished sources.

Indices of harvest efficiencies that have been calculated for Japan and the U.S.S.R. are the catches in metric tons per vessel day, per vessel-ton-day and per-man-day (Table 59). For Japan it also was possible to calculate the dollar values for each of these units of effort (Table 60). These and other kinds of indices can be used to evaluate year-to-year changes in the efficiency of a particular fishery or to compare the efficiency of similar fisheries carried out by different nations. Japan's North Pacific Trawl Fishery and the Soviet factory trawl fishery are comparable in terms of the general size and layout of vessels employed and the species sought; the indices of these two fisheries are underlined in Table 59 to facilitate visual comparison between them.

The indices shown in Tables 59 and 60 provide information on different aspects of productivity. The catch-per-vessel day is a useful measure of year-to-year changes in vessel productivity as long as the size of vessels employed in the fishery remains relatively constant. Unfortunately, this situation of constancy seldom occurs and in such cases the catch-per-ton day is a better index of vessel productivity. The catch-per-man day is an index of year-to-year changes in labor productivity within a given fishery or it may be used to compare labor productivity between different fisheries. The monetary value of a given catch is not the same for all fisheries because each fishery targets upon different species which may be processed into products of different value. In recognition of this fact, indices of the value of the catches per unit of vessel and man effort are shown in Table 60 for Japan's fisheries in 1971–1974 to supplement the indices of weight of catches provided in Table 59. Information was not available to calculate indices for the value of the Soviet catches.

Table 59 - Catch in metric tons per vessel day, per vessel-ton-day, and per-man-day for groundfish and herring fisheries by Japan off Alaska in 1971-1974 and by the USSR in 1971-1975. Figures shown are for the combined areas--Eastern Bering Sea, Aleutians, and Gulf of Alaska--and for days on the fishing grounds observed by NMFS law enforcement personnel.

	Metric Tons		
	Vessel Day	Vessel-Ton-Day	Man Day
JAPAN			
1971			
Mothership Fishery			
Motherships	846		1.85
Catcher Vessels	53	0.25	3.11
Total			1.16
North Pacific Trawl	52		0.72
Longline/Gillnet	13		0.43
1972			
Mothership Fishery			
Motherships	847		1.78
Catcher Vessels	51	0.25	3.00
Total			1.12
North Pacific Trawl	54		0.72
Longline/Gillnet	12		0.42
1973			
Mothership Fishery			
Motherships	797		1.71
Catcher Vessels	48	0.26	2.91
Total			1.07
North Pacific Trawl	65		0.81
Longline/Gillnet	10		0.32
1974			
Mothership Fishery			
Motherships	703	0.07	1.90
Catcher Vessels	44	0.21	2.96
Total			1.16
North Pacific Trawl	47	0.02	0.56
Longline/Gillnet	8	0.02	0.26
1975 - Not Available			
Mothership Fishery			
Motherships			
Catcher Vessels			
Total			
North Pacific Trawl			
Longline/Gillnet			

	Metric Tons		
	Vessel Day	Vessel-Ton-Day	Man Day
USSR			
1971			
Factory Trawl	42	0.01	0.47
Side Trawl	11		0.39
1972			
Factory Trawl	52	0.02	0.58
Side Trawl	16		0.55
1973			
Factory Trawl	45	0.01	0.50
Side Trawl	Not Available		
1974			
Factory Trawl	51	0.02	0.57
Side Trawl	15	0.02	0.46
1975			
Factory Trawl	33	0.01	0.36
Side Trawl	17	0.02	0.56

Table 60--Landed (ex-vessel) value of catch per vessel-day and man-day for groundfish and herring fisheries carried out by Japan off Alaska, 1971-1974.

	Value of Catch in U.S. Dollars	
	Vessel Day	Man Day
1971		
Mothership Fishery		85.63
North Pacific Trawl Fishery	5,029	69.85
Longline/Gillnet Fishery	4,961	165.38
1972		
Mothership Fishery		88.71
North Pacific Trawl Fishery	6,975	91.79
Longline/Gillnet Fishery	5,734	124.48
1973		
Mothership Fishery		113.07
North Pacific Trawl Fishery	12,368	154.60
Longline/Gillnet Fishery	7,221	240.69
1974		
Mothership Fishery		132.97
North Pacific Trawl Fishery	9,165	110.42
Longline/Gillnet Fishery	7,351	245.05

Factory ships, refrigerator transports, tugs, etc., are employed by Japan and the U.S.S.R. in support of their fishing operations. The vessel days and man days expended in the support activities should be included in the calculation of productivity indices but it was not possible to do so here. However, it is known that the man-days of effort expended by the Soviets on support activities is higher than that expended by Japan for similar fisheries (Pruter 1976). If it had been possible to include the effort expended by Japan and the U.S.S.R. on support activities, the relative efficiency of Japanese fisheries over Soviet fisheries would be even greater than suggested by the indices in Tables 59 and 60.

Another factor which supports the conclusion that the Japanese fisheries are more efficient than their Soviet counterparts is that the Japanese catches are generally processed into more finished products. For a given catch, the Japanese products, therefore, would be of higher value than the Soviet products, if they were sold in free competition with each other. Allowing for this factor further increases the efficiency of Japanese operations compared to Soviet operations.

5.2 Domestic.

5.2.1 Domestic annual capacity (DAC).

In an effort to obtain an estimate of the annual capacity of the domestic operations in the Gulf of Alaska, officials of fifteen companies were contacted. The companies represented by the officials interviewed have processing plants in 27 locations on the Gulf of Alaska. The sample is not complete, and is not represented as such; however, it does provide a measure of the latent capacity available for catching and harvesting the fishery resources of the Gulf without the necessity for the capital investment required to start up from ground zero.

Total capacity has been considered as an aggregate of the capability for harvesting, handling, freezing, and holding. Each has been treated separately in this section.

5.2.1.1 Harvesting capacity.

The estimates of domestic capacity to harvest groundfish in the Gulf is the most difficult to determine. With the exception of the longline fisheries, there has been little or no domestic effort involving groundfish that remotely resembles the foreign effort from the standpoint of target species, vessel type or fishing technique.

In an analysis of the vessels utilized in the Alaska shellfish fishery, the University of Washington Sea Grant Program (NORFISH) [12] classified the vessels in groups in accordance with their capability to trawl, among other things, taking into consideration such things as horsepower and hull type. In making the estimation of domestic harvesting capacity, the NORFISH report was used as the basis, with adjustments made in average hold capacity in the combination crabber-trawler group—the group used—as a result of information from initial shellfish research group sessions held by the Alaska Commercial Fisheries Entry Commission (ACFEC) as part of a contract with NMFS to establish a bio-economic data base. The hold capacity of 165 vessels in the combination crabber-trawler class at the time (1974) the fleet was surveyed, was 25,376,000 pounds based on 40 pounds of iced shrimp or fish per cubic foot of hold space. The classification of the vessels in the combination group appears in the following table.

Obviously, 1974 data is obsolete, especially since the recent addition of a number of new combination vessels in the 130 feet class. Also, the carrying capacity of the vessels is just one measure of fishing capacity.

In much of the planning done for calculating the catching capacity to provide product for new enterprises, a five-day turnaround and an average of 200 days at sea per year have been assumed. Assuming that each vessel could catch its hold capacity each trip, then (200 ÷ 5) × 25,376,000 = 1,015,040,000 pounds or an annual catching capacity of 460,589 mt.

Since it is not realistic to assume that vessels will be filled to capacity each trip, or that weather will permit all vessels to fish the total time they are available, the estimate of harvesting capacity has been adjusted downward in an attempt to more accurately reflect the actual capacity.

If it is assumed that a vessel is able to fish sixty percent of the time it is available due to run time and weather, and catches average 20 mt per day (an estimated rate that appears realistic) throughout the fleet, then 165 vessels × 120 fishing days × 20 mt = 396,000 mt. The determination of whether or not the foregoing estimates are reasonable must wait for experience in the fishery. In any case, it appears that there is adequate fishing power to satisfy the near future plans of the industry.

[12] NORFISH, NR26, Technical Report 61, University of Washington Sea Grant, August 5, 1976. Classification Enumeration, and Vessel Characteristics of Alaskan Shellfish Vessels.

NORFISH Class	Number of Vessels	Length Group (feet)	$\bar{x}$ Hold Volume (cu. ft.)	Capacity 40 lbs. X Vol. (pounds)	Group Total (pounds)
8.1	23	59.1-70	2800	112,000	2,576,000
8.2	70	70.1-82	3000	120,000	8,400,000
8.3	31	82.1-90	3500	140,000	4,340,000
8.4	28	90.1-100	5500	220,000	6,160,000
8.5	13	100.1-120	7500	300,000	3,900,000
	165				25,376,000

The capacity of the domestic longline fleet is discussed in Section 3.2.1.

5.2.1.2 Processing capacity.

The processors provided information on the amount of raw product that could be processed during a shift in the off season, when other species were not being delivered, and in the peak season for other fisheries.

As with the estimate of harvesting capacity, an estimate of processing capacity lacks the precision of experience. Part of the shift capacity information was obtained from processors involved in groundfish processing, and a number of the estimates were based either on shellfish processing experience or daily freezing capacity. The responses from the industry indicated a shift capacity of 966 mt per day for the 19 plants for which data and estimates were given. The capacity would be reduced by 255 mt per day to process groundfish during the peak of the season for other species such as king crab, halibut, salmon.

It is estimated that plants actively operate 250 days a year after down time, and idle periods caused by weather or product avaliability are considered. If it is assumed that the plants are processing species other than groundfish for 60 percent of their operation, and therefore would have a daily capacity for groundfish of 711 mt tons for 150 days, then they would be able to operate for 100 days at 966 mt. The annual processing capacity for those plants for which information was obtained would be: (150 x 711 mt)+(100 x 966 mt) or 106,650 mt+96,000 mt=203,250 mt.

An expanded survey should indicate substantially more capacity, because several major processing companies were not represented in the information available at this time.

5.2.1.3 Freezing capacity.

The daily freezing capacity for the nineteen plants was obtained for peak (when other species are being handled) and off-season. The off-season capacity of the plants is 1,254 mt, with a reduction of only about 90 mt during the peak season. It was indicated by several processors that within limits, the constraint on production is usually caused by difficulties in maintaining a good work force rather than the physical capacity of the plant. Assuming 250 days of operation, with 150 days at 1,164 mt and 100 days at 1,254 mt, an annual freezing capacity of (150 x 1,164 mt)+(100 x 1,254 mt)=300,000 mt is indicated. When a complete survey of the industry can be conducted, a substantial increase should result.

5.2.1.4 Holding capacity.

The survey indicated a plant holding capacity of 11,386 mt. The holding capacity of several major processing plants is quite small compared to their daily freezing capacity. This is because in recent years, rather than invest the capital to hold large quantities of product, the industry utilizes freezer vans, which the transportation companies rotate on a regular time table. This keeps the product moving steadily to the markets, and precludes the necessity of warehousing at the plant.

5.2.2 Expected domestic annual harvest (DAH).

Estimates of the domestic capacity to physically take and process Gulf of Alaska groundfish indicate that a capacity exists to account for a substantial portion of the total Gulf OY. However, due to market conditions, among other things, the relationship between the total domestic capacity to catch, process and hold groundfish has little

relationship to the expected harvest and processing by domestic industry of a number of the groundfish species in the Gulf of Alaska during 1978.

In order to ascertain just how much of the total domestic capacity would be utilized in 1978, the industry representatives were asked to furnish their projections for moving into the groundfish fisheries. Although considerable planning has been done to established joint ventures or contacts for foreign processing ships to purchase raw fish directly from U.S. fishing vessels, this form of domestic utilization will not be allowed during the first six months of 1978 in order to provide the manpower opportunity for expansion of shore-based processing facilities. The expected domestic annual harvest for 1978, therefore, has been considered only from the standpoint of deliveries to domestic processing plants.

5 2.2.1 Delivered to U.S. processors.

While most U.S. processors interviewed indicated an intense interest in developing a fishery for Gulf groundfish, market conditions apparently will have to improve before such a venture can be practical. Of the 16 processing companies involved in the survey taken, 8 indicated that they were making plans to develop processing capacity and techniques in 1978. These companies plan to develop capacity in 16 plants in the Gulf. The total expected harvest for 1978 is 44,500 mt, with the individual species DAH's as shown in Table 61.

The estimates are based on a variety of approaches to development, from sample lots for testing the market and obtaining experience to substantial plant commitments (22 million pounds for one company). In any case, U.S. industry is showing an intense interest in the opportunities presented by the FMCA of 1976.

The DAH of each species has for conservation reasons been apportioned to individual statistical areas (table 64).

5.2.2.2 Delivered to foreign factory ships.

Delivery of U.S.-caught groundfish to foreign processing vessels will not be permitted during at least the first 6 months of 1978. If such arrangements are allowed later in the year, the DAH will be raised as necessary by reallocation from the reserve.

TABLE 61.—*Expected domestic annual harvest (DAH) of groundfish from the Gulf of Alaska in 1978*

Species	Metric tons
Pollock	14,200
Cod	15,500
Flounders	7,200
Pacific Ocean perch	1,100
Other rockfishes	2,000
Sablefish	4,000
Atka mackerel	.....
Squid	.....
Other species	500
Total	44,500

6.0 Optimum yield concept.

The departure from maximum sustained yield (MSY) to optimum yield (OY) will be accomplished through the following steps (see section 2.2 for definitions): (1) Maximum sustainable yield (MSY) or current equilibrium yield (EY) to allowable biological catch (ABC); (2) ABC to OY. OY will be apportioned to statistical areas (figure 1) on the basis of biomass (when available) or recent catch proportionalities (tables 63 and 64).

6.1 Departure from MSY to ABC for biological reasons.

Of the nine species or species categories[13] which support the Gulf of Alaska groundfish fishery, MSY and EY were evaluated for eight in section 4.7; MSY and EY do not apply to the ninth category—"Other Species." Only Pacific ocean perch and sablefish are incapable of producing MSY.

In determining ABC, an appraisal of the biological data base indicates a degree of incompleteness that warrants a conservative approach to exploitation. Until there is evidence to support a contention that higher yields can be sustained, only catch levels which are equal to or less than the low end of the MSY/EY ranges can be considered relatively free from risk of overexploitation (this concept acknowledges the possibility of underexploitation but, in the biological sense, overexploitation can lead to reduced abundance or even ecosystem imbalance that might prevail for years while underexploitation leaves the resource base in a healthy condition, need only have a temporary effect on user groups, and, to some extent, the temporary loss to the users can be made up the following year).

Accordingly, ABC's for pollock, cod, flounders, squid, and rockfish (other than ocean perch), are considered equal to the low end of the MSY range (Table 58). The only estimate of MSY/EY for Atka mackerel is from a recent report of unsubstantiated Soviet research findings. Until those findings can be verified, ABC for that species should be no more than 75 percent of the reported EY (table 58), again preferring the risk of short term underexploitation to the risk of long term effects of overharvest. This value (24,800 mt) is near the 1975-76 average catch of 24,200 mt and will not result in a decrease in production.

Concerning sablefish, inasmuch as the most optimistic estimate of EY is 21 percent below MSY, ABC will be set below 17,400 mt (the low end of the EY range) to allow rebuilding to occur.

With regard to "Other Species," the concept of a phased reduction in the allowed catch of this category to force more accurate reporting of catch by species remains valid. As described in the preliminary fishery management plan for the Gulf of Alaska trawl fishery this will be accomplished by reducing the allowed catch of this category by 10 percent per year after 1978. ABC for "Other Species" in 1978 is set equal to the 1977 total allowable catch of this category, or 16,200 mt (table 58), with the expectation that a 10 percent annual reduction in the allowable catch will begin in 1979.

A final ABC consideration is that little is known concerning specific stock units for the Gulf of Alaska groundfish populations. If any of those populations are composed of more than a single stock unit, removals which are disproportionate to individual stock abundances would lead to localized over- and under-exploitation. As a first step toward mitigating this potential problem, and until more information on stock identity and distribution is available, ABC for each species will be apportioned to the five individual major statistical areas (table 58). This will be done in proportion to the biomass in each area, where known, or in proportion to recent catch patterns which presumably reflect the abundance in each area relative to the others.

6.2 Departure from ABC for socioeconomic reasons.

When the foreigh fisheries began operating in the eastern Bering Sea and the Gulf of Alaska in the early 1960's, the groundfish resources (excepting Pacific halibut) were in their virgin state. The accumulated stock associated with an unexploited population provided high catch rates—theoretically about twice that expected in a fully developed fishery—which undoubtedly helped foreign fishermen to offset the costs of fishery development.

Should those fisheries, which are still dominated by foreign fishermen, be managed in a manner that maximized physical yield (i.e., MSY or ABC), the domestic fishery will be forced to begin its development not only in competition with foreign fishermen who have more than 10 years of experience on the grounds and who have a substantial, if not predominant, effect on both the international and domestic market, but with the depressed catch rates that result from heavy exploitation. On the other hand, severe curtailment of the foreign fisheries during the period of domestic fishery development is likely to result in a diminished supply of groundfish to the domestic market and higher prices to the American consumer.

Data bearing on the socio-economic effect of either extreme are not available because of a virtual absence of domestic participation in the fishery; it seems clear, however, that neither extreme would satisfy that portion of the definition of "Optimum Yield" which deals with " * * * the greatest overall benefit to the nation * * *.

Given this lack of data, but recognizing that the ABC for each species was set in a manner intended to assure maintenance of healthy stocks (except for Pacific ocean perch and sablefish which are currently in a depressed state), optimum yields—with three exceptions—are considered equal to ABC. The exceptions—Pacific ocean perch, flounders, and sablefish—are described below.

Pacific ocean perch. Current EY for this species is believed to be about 50,000 mt, or only 33-40 percent of MSY. To rebuild the stock(s) to a level that would again produce MSY will require that catch be held below EY; the greater the difference between catch and EY, the shorter the rebuilding period. As a compromise between a moratorium on perch fishing (giving the shortest period of rebuilding) and allowing catch to equal EY (in which case no rebuilding would occur), OY is set midway between the extremes—25,000 mt.

Flounders. ABC for this species complex was determined to be about 67,000 mt, more than twice the highest catch of record. Several of the flounder species are known to have a geographic and bathymetric distributional pattern that is similar to that of halibut, leading to the concern that a gross increase in flounder production would, through a commensurate increase in incidental catch (and mortality) of halibut, negate other conservation measures designed to grant additional halibut protection. In very simple economic terms and assuming that prices remain stable, the MSY of flounders at $0.10/pound ex-vessel has a total annual value of $14.8 million; the MSY of halibut in the Gulf of Alaska at about $1 (round weight) ex-vessel, has a total annual

[13] Excluding halibut, the management of which in 1978 is vested with IPHC.

value of some $70 million. Considering the disparity in potential value and the fact that the domestic fishery for halibut is fully developed and facing a current crisis, while the flounder fishery has operated at a very low level with its full domestic potential not expected to develop until some time in the future, optimum yield for flounders is set at 50 percent of ABC—33,500 mt. This level will still allow an expansion of the flounder fishery during which its impact on halibut can be evaluated.

Sablefish. Because this species is of special importance in the development of a domestic groundfish fishery in the Gulf of Alaska, OY has been set at a level that: (1) Will allow rebuilding to MSY within a minimum time frame; (2) takes account of recent reports of U.S. fishermen of a scarcity of sablefish on the traditional fishing grounds of Southeast (in both inside and outside waters; and (3) reflects concern over the Japanese catch per boat-day trend which has declined much more sharply than the catch per skate indicator and used to estimate EY. Accordingly, OY for this species in 1978 is 13,000 mt.

6.3 Optimum yield (OY).

Optimum yield for the groundfish species and species groups of the Gulf of Alaska (except halibut) are shown in tables 58, 62, and 64. Optimum yield for halibut in 1978 will be determined by the International Pacific Halibut Commission.

7.0 Foreign allowable catch (FAC).

U.S. fishermen will have reserved for their use during 1978 any amount of any species, up to the optimum yield, based on credible projections of catch as of September 1977. The optimum yield (OY) of any species may not, for any reason, be exceeded by the all-nation fishery.

Optimum yields for each groundfish species or species group in the Gulf of Alaska are shown in table 58; expected domestic annual harvest (DAH) projections are shown in table 61. The foreign allowable catch (FAC) will be determined and applied as described below.

Because: (1) Growth of the domestic groundfish fishery cannot be accurately forecast; (2) constraints against growth of the domestic fishery up to the level of optimum yield are contrary to the intent of Pub. L. 94-265; (3) optimum yield should neither be exceeded nor should it go unrealized; and (4) recognizing that domestic fishermen are often restricted in their activity during a season, it is, therefore, not unreasonable to make in-season amendments to measures applying to foreign fishermen, FAC will be set in a manner so as to allow in-season adjustments between foreign and domestic fisheries. Such adjustments will be dictated by domestic fishery performance and will be accomplished as follows:

The initial FAC of each species for 1978 will equal DAH subtracted from 80 percent of OY: FAC=(0.8 OY)−DAH. The remaining 20 percent of the OY will be apportioned to foreign or domestic fisheries, as the season progresses, on the basis of continuing reappraisals of DAH. The Gulf-wide schedule of OY/reserve/DAH/FAC is given in table 62. FAC and reserve has also been apportioned to individual statistical areas (table 64).

This accommodates, initially, a conservative appraisal of DAH (and less risk of loss of credibility) because up to 20 percent of the OY for each species could later be added to the U.S. "share."

Table 62 -- Derivation of foreign allowable catch (TAC) 1/
for Gulf of Alaska groundfish (1000's mt)

Species	OY	Reserve	DAH	FAC1/
Pollock	168.8	33.8	14.2	120.8
Cod	34.8	7.0	15.5	12.3 2/
Flounders	33.5	6.7	7.2	19.6
Pacific ocean perch	25.0	4.9	1.1	19.0
Other Rockfishes	7.6	1.5	2.0	4.1
Sablefish	13.0	2.6	4.0	6.4
Atka mackerel	24.8	5.0	0	19.8
Squid	2.0	0.4	0	1.6
Other species	16.2	3.2	0.5	12.5
Totals	325.7	65.1	44.5	216.1

1/ Initial FAC; may be increased as reserve is apportioned during year.

2/ The area landward of the 500 m isobath and west of 157 degrees West longitude is designated as a longline fishery for Pacific cod. The maximum allowable foreign catch (including the 50 percent reserve) for the area would be 6,233 mt.

Table 63 -- Percentage of OY apportioned to each major statistical area
(based on values in Table 62)

	Shumagin	Chirikof	Kodiak	Yakutat	Southeast	Tot
	(%)					
Pollock	33.8	32.2	24.2	7.4	2.4	10
Cod	27.6	11.8 1/	44.1	12.3	4.2	100
Flounders	31.0	8.0	36.0	19.0	6.0	100
POP	10.8	10.8	20.7	31.9	25.9	100
Other rockfish	4.0	3.0	8.0	45.0	41.0	100
Sablefish	15.9	10.9	13.2	26.8	28.2	100
Atka mackerel	17.7	14.5	63.7	4.0	0	99
Squid	20.0	20.0	20.0	20.0	20.0	100
Others	26.9	22.1	31.0	13.1	6.9	100

1/ Approximately 40 percent of the Chirikof Statistical Area is included in the longline fishery for Pacific cod which provides for a directed fishery for Pacific cod only by foreign longliners in the area west of 157° West longitude and landward of the 500 meter isobath.

Table 64 -- OY[1] Reserve/DAH/FAC[2] Schedule, By Area (1000's mt)

Species		Shumagin	Thirikof	Kodiak	Yakutat	Southeast	Total
Pollock	OY	57.0	54.1	40.3	12.5	4.1	166.8
	Reserve	11.4	10.9	8.2	2.5	0.8	33.8
	DAH	4.8	4.6	3.4	1.1	0.3	14.2
	FAC	40.8	38.9	29.2	8.9	3.0	120.8
Cod	OY	9.6	4.1	15.3	4.3	1.5	34.8
	Reserve	1.9	0.8	3.1	0.9	0.3	7.0
	DAH	4.3	1.8	6.8	1.9	0.7	15.5
	FAC	3.4	1.5	5.4	1.5	0.5	12.3[3]
Flounders	OY	10.4	2.7	12.0	6.4	2.0	33.5
	Reserve	2.1	0.5	2.4	1.3	0.4	6.7
	DAH	2.2	0.6	2.6	1.4	0.4	7.2
	FAC	6.1	1.6	7.0	3.7	1.2	19.6
Pacific ocean perch	OY	2.7	2.7	5.2	7.9	6.5	25.0
	Reserve	0.5	0.5	1.0	1.6	1.3	4.9
	DAH	0.1	0.1	0.2	0.4	0.3	1.1
	FAC	2.1	2.1	4.0	5.9	4.9	19.0
Other rockfish	OY	0.3	0.2	0.6	3.4	3.1	7.6
	Reserve	0.1	Trace	0.1	0.7	0.6	1.5
	DAH	0.1	Trace	0.2	0.9	0.8	2.0
	FAC	0.1	0.2	0.3	1.8	1.7	4.1
Sablefish	OY	2.1	1.4	2.4	3.4	3.7	13.0
	Reserve	0.4	0.3	0.5	0.7	0.7	2.6
	DAH	0.1	Trace	0.1	0.3	3.0	4.0
	FAC	1.6	1.1	1.8	1.9	0	6.4
Atka mackerel	OY	4.4	3.6	15.8	1.0	0	24.8
	Reserve	0.9	0.7	3.2	0.2	0	5.0
	DAH	0	0	0	0	0	0
	FAC	3.5	2.9	12.6	0.8	0	19.8
Squid	OY	0.4	0.4	0.4	0.4	0.4	2.0
	Reserve	0.1	0.1	0.1	0.1	0.1	0.4
	DAH	0	0	0	0	0	0
	FAC	0.3	0.3	0.3	0.3	0.3	1.6
Other Species	OY	4.4	3.6	5.0	2.1	1.1	16.2
	Reserve	0.9	0.7	1.0	0.4	0.2	3.2
	DAH	0.1	0.1	0.2	0.1	Trace	0.5
	FAC	3.4	2.8	3.8	1.6	0.9	12.5

1/ Based on percentages shown in Table 63.
2/ Initial FAC; may be larger as reserve is apportioned during year.
3/ Of this total, only (including the 20 percent reserve), 6,200 mt can be taken west of 157 degrees West longitude.

8.0 Management regime.

8.1 Management objectives.

Four major objectives dictate the philosophy of management of the groundfish fisheries in the Gulf of Alaska. In priority order, they are:

(A) Rational and optimal use, in both the biological and socio-economic sense, of the region's fishery resources as a whole;

(B) Protect the Pacific halibut resource, which for decades has supported the only significant U.S. groundfish fishery in the region, but which is currently in a state of grave decline;

(C) Provide for the orderly development of domestic groundfish fisheries, consistent with (A) and (B) above, at the expense of foreign participation;

(D) Provide for foreign participation in the fishery consistent with (A), (B), and (C) above, to take that portion of the optimum yield not utilized by domestic fishermen.

8.2 Area, fisheries, and stocks involved.

This fishery management plan and its management regime applies:

(A) To the U.S. fishery conservation zone of the North Pacific Ocean, exclusive of the Bering Sea, between 170° west longitude on the west and 132°40′ west longitude on the east.

(B) To all foreign and domestic fishing vessels operating in the area described in (A) above except:

(1) The taking of halibut by United States and Canadian vessels which are operating under International Pacific Halibut Commission regulations;

(2) Those Canadian vessels fishing in accordance with the U.S.-Canada Reciprocal Fisheries Agreement signed February 4, 1977; and

(3) Those U.S. vessels operating in shrimp, crab, or scallop fisheries.

(C) To all stocks of squid and finfish—except salmon, steelhead trout, Pacific halibut, herring and tuna—which are distributed or are exploited predominately in the area described in (A) above.

8.3 Management measures and rationale.

8.3.1 Domestic.

8.3.1.1 Season, gear, area, and catch restrictives.

(A) Areal division of DAH. The DAH for all species has been apportioned to individual statistical areas, as shown in table 64.

(B) Seasonal division of DAH. None.

(C) Prohibited species. In accordance with existing State and Federal statutes.

(D) Time-area closures. (1) June 1-November 30. None.

(2) January 1-May 31 and December 1-31. When the total incidental trawl catch of halibut in any statistical area exceeds that amount listed below, that statistical area shall be closed to domestic trawling for the remainder of this period: Shumagin—29 mt, Chirikof—18 mt, Kodiak—34 mt, Yakutat—17 mt, Southeast—14 mt (i.e., 1 percent of 25 percent of DAH).

(E) Gear restrictions. (1) June 1-November 30. None.

(2) January 1-May 31 and December 1-31. (a) Only off-bottom trawls may be used, (b) duration of individual tows shall not exceed 1 hour.

(F) Notification and observers. (1) All groundfish trawlers must, when so requested, take aboard an official observer.

(G) In-season adjustment of time and area. Management of shellfish and finfish fisheries by the State of Alaska in recent years compares favorably with the management of most other fisheries in the United States and elsewhere. The success of this management program may be largely attributed to the deliberate flexibility built into the governing system by State law and the resultant ability of the Board of Fisheries and the Department of Fish and Game to make timely changes in the regulations to meet changing needs and conditions. This flexibility which has been realized through annual revision of the regulations by the Alaska Board of Fisheries, together with emergency orders and regulations issued in season by the Department, has resulted in many benefits:

(a) New information and data relating to resource management can be immediately incorporated into the management program, even when the fishery is in progress.

(b) The management approach adopted by the Board prior to the season can be adjusted and refined during the season on the basis of assessment of actual resource conditions.

(c) Unanticipated resource conditions can be reacted to immediately to prevent both underfishing and wasteful underutilization.

(d) The dangers posed by high effort levels of efficient harvesting units (as where fleet capacity equals or exceeds the OY) can be closely controlled.

(e) Unexpected developments with respect to economic and social factors (natural disaster, changes in marketing conditions cannery fires) can be accommodated so the resources are distributed and allocated in a manner which maximizes overall public benefits.

(f) Management philosophies and policies formulated through legislative and administrative processes may be carried out in the field by personnel familiar with local conditions.

(g) Management approaches which are proving unworkable or which are imposing undue hardships may be changed at once.

(h) Necessary in-season refinements in management programs can be accomplished primarily in the field with the advice and assistance of the users more directly affected.

(H) Issuance of field orders. The council finds that the Optimum Yields in this plan, which are based upon projections of the status of the stocks, ecomomic and other conditions several months in advance of the actual conduct of the fishery, may be found to be mis-specified in light of unpredicted and unanticipated adverse or favorable stock conditions which are revealed in-season. Under such circumstances, the Council further finds it appropriate for conservation purposes only, that the Regional Director of the National Marine Fisheries Service, Alaska Region or his designee in close coordination with the Commissioner of the Alaska Department of Fish and Game, take immediate action by issuing field orders adjusting time and/or area restrictions; therefore, this plan provides that seasons and areas shall be subject to in-season adjustment by the Regional Director of the National Marine Fisheries Service. The Regional Director or his designee may adjust season opening and closing dates based upon the following considerations:

1. The effect of overall fishing effort within a major statistical area;

2. Catch per unit effort and rate of harvest;

3. Relative abundance of stocks within the area in comparison with pre-season expectation;

4. The proportion of halibut (see section 8.3.1.1 (D)) or crab being handled;

5. General information on the condition of stocks within the area;

6. Information pertaining to the optimum yield for stocks within the statistical area; and

7. Any other factors necessary for the conservation and management of the groundfish resource.

In order to assume effective management of the groundfish resource as a unit throughout its range, in-season adjustments made by the Regional Director must be coordinated with similar actions taken by the State regarding waters under State jurisdiction. It is necessary that the Regional Director, to the extent possible, act in conjunction with the Alaska Department of Fish and Game in order effect uniformity of management in State waters and the fishery conservation zone. As a result, any changes proposed by the Regional Director will be accompanied by advance notice to the State to allow for opportunity to maintain such uniformity. In most cases, the Regional Director will exercise his authority on the basis of recommendations received from the Department, and will reply on the Department for season data, reports, and assessments necessary to make a determination as to the advisability of any action contemplated. In all cases, continuous consultation between the Department and the Regional Director will be maintained.

It is expected that the actual opening and/or closing dates for the seasons prescribed in this plan will be adjusted by the Regional Director pursuant to the Authority described in this section. Such action is not considered emergency action that would require amendment of the plan, or regulations implementing the plan; adjusting the season opening and closing dates is meant to be inherent part of the seasons themselves. For this reason, any adjustments made by the Regional Director or his designee will be effected by the issuance of a field order and announcement in the manner currently utilized by the State of Alaska.

Any in-season amendment of the plan's season or area or other implementing regulations beyond the scope of the above described authority will be accomplished by emergency regulation, as provided by section 305(e) of the Act, in accordance with the recommendation of the Regional Director following consultation with the Commissioner of the Department of Fish and Game. It is understood that time will often be of the essence in making effective the aforementioned adjustments and changes.

Entry limitation on that portion of a fishery within contiguous territorial waters under State jurisdiction may become necessary while some foreign fishing continues in the conservation zone because of the effects of concentrated effort on the stock distributions within territorial waters. In considering limited entry under such conditions, at lease two things must be borne in mind: (1) The relationship of domestic fishing activity inside the 3-mile limit to that outside; and (2) the potential compatibility of a limited entry system within the 3-mile limit to any system that might be established for the domestic fleet in the conservation zone in the future.

Whether within State jurisdiction or within the conservation zone, limited entry should not be established unless the need for it can be demonstrated. There are several considerations that can be viewed as indicators or "warning lights" whose intensities can vary. Not all of them need be lit to indi-

cate that limited entry is needed; various combinations and intensities can indicate the need. Criteria for identifying that need to limit entry in a fishery include the following considerations:

(1) Full utilization of any fishery;

(2) Relationships of the domestic fishery to actual or potential activity in other fisheries, i.e., non-target species catch and mortality; whether earnings from one fishery may be necessary to support or encourage activity in another fishery; etc.;

(3) Decreasing precision and effectiveness of conventional management and regulatory methods, creating a greater risk of management error culminating in major underharvest or overharvest;

(4) A significant increase in the number of units of fishing gear;

(5) Excess capacity in the fleet, or conditions approaching excess capacity;

(6) Reduced average earnings by fishermen;

(7) A fishery whose profits are sustained only by rising fish prices, which offset significant declines in catch per unit effort;

(8) Constriction of fishing time (periods, seasons, etc.);

(9) Detrimental on-shore effects from the preceding conditions, including decreased standard of living, increased unemployment and dependence upon welfare, and labor force costs and retention problems.

Any limited entry program must be designed specifically for the fishery to which it will be applied, taking into consideration the unique characteristics of that fishery. Since limited entry may cause social and economic dislocation, a program must be tailored specifically to minimize or avoid these effects in a given fishery.

The fishery should be monitored and data collection started so that conditions such as those described above can be identified and measured. The data base should also indicate the character and level of participation in the fishery, including: (a) Investment in vessel and gear; (b) the number and type of units of gear; (c) the distribution of catch; (d) the value of catch; (e) the economic returns of the participants; (f) mobility between fisheries; and (g) various social and community considerations.

With such a monitoring system, when managerial and/or economic indicators signal the need for limited entry, much of the information will be available to allow timely design and implementation of the best program.

Means should also be established to determine the optimum effort level for the fishery. Two major considerations here are: (1) A level that allows effective resource management; and (2) a level that allows a reasonable average rate of return. These concepts, and perhaps others, would have to be elaborated and specified for the fishery. Other considerations bearing on optimum effort levels may suggest themselves as the concept of optimum yield is developed.

The current condition of the groundfish fisheries of the Gulf of Alaska is such that limited entry programs for the domestic fleet will not be required in the near future. However, research and monitoring programs such as those suggested above should be developed and implemented in a timely manner.

In Alaska, where groundfish fisheries may occur completely or partly in waters under State jurisdiction, some fisheries may eventually be included in a State limited entry program. Especially in fisheries under divided jurisdiction, coordination between the North Pacific Fishery Management Council and the State will be necessary in order to develop a comprehenshive program that recognizes unique local or regional conditions as well as the national standards of the Fishery Conservation and Management Act of 1976.

8.3.2 Foreign.

8.3.2.1 Season, gear, area, and catch restrictions.

(A) Areal-division of FAC for all species has been apportioned to individual statistical areas, as shown in Table 64. To reduce the likelihood of uneven exploitation on localized stocks or concentrations.

(B) Seasonal division of FAC. No more than 25 percent of the total FAC may be taken during the periods January 1–May 31 and December 1–31 combined. The distribution of halibut varies seasonally and, at times, differs from that of other groundfish (Sec. 3.6.2). The incidental catch of halibut is likely to be highest from December 1–May 31 because most fishing for groundfish occurs at depths over 100 meters where halibut concentrate during the winter-spring. Data from observer programs indicate a 3 percent incidence of halibut during winter-spring and 0.5 percent during summer-fall. The total FAC is about 181,000 mt; with the proposed restriction no more than 45,250 mt would be allowed during winter-spring. This would result in an annual halibut incidental catch of 2,037 mt, i.e., 1,358 mt during winter-spring and 679 mt during summer-fall. This compares with an incidental catch of 3,168 mt if the fishery operated uniformly throughout the year and amounts to a halibut savings of 1,130 mt.

(C) Prohibited species. Foreign vessels operating in this fishery must reduce to the minimum their incidental catch of, and may not retain any of the following species or species groups: (1) salmonids, (2) Pacific halibut, (3) shrimp, (4) herring, (5) "Creatures of the Continental Shelf" (6) scallops. To prevent covert targeting on species of special importance to the United States.

(D) Time-area closures. (1) The following areas shall be closed to all foreign fishing for the periods specified:

(a) Landward of a line 12 miles offshore from the baseline used to measure the territorial sea—year round. To prevent conflicts with established, inshore domestic fisheries and the small vessels often used in those commercial, subsistence, and recreational fisheries.

(b) Within the three U.S. fishing sanctuaries described in Appendix I and shown in Figures 13 and 14—year round. To provide sanctuaries for the expansion of domestic setline fisheries for sablefish to offshore waters. Catches from inside waters are limited by a State of Alaska quota and declining catch rates, but gear losses to foreign trawlers and preemption of grounds by foreign setliners have prevented expansion of the domestic fishery to productive outside waters.

(c) "Davidson Bank", as described in Appendix I and shown in Figure 15—year round. To preserve as a sanctuary for developing U.S. fisheries an area with healthy concentrations of several groundfish species which is within range of already established cold storage and processing facilities at Dutch Harbor and Sand Point.

(2) The following areas shall be closed to foreign trawling during the periods specified: (a) 140° W–147° W, as shown in Figure 15—January 1–February 15, and November 1–December 31. This area includes the important "Yakutat" and "W" grounds where halibut concentrate for spawning during November–February. The closure reduces incidental catches of halibut, provides protection against a possible directed fishery on spawning halibut, and prevents disturbance of the spawning grounds. The benefits from the closure cannot be accurately quantified as they depend on the amount of directed (illegal) fishing on halibut and on whether effort is shifted to open areas where the incidence of halibut may be nearly as high (Sec. 3.6.2). The annual incidental catch in this area has averaged about 1,500 mt. A similar but one-month shorter closure is currently in effect for foreign fishermen.

(b) 147°–157° W as shown in Figure 15—February 16–May 31. This is the most productive area for the North American halibut fishery in the Gulf; over half of the annual catch occurs here. The incidence of halibut in the trawl fishery is highest during the winter and spring (see Section 3.6.2). The closure is designed to reduce the halibut catch by trawls and allow the grounds to remain undisturbed for several months before the opening of the halibut season which usually begins in early May. Benefits from closure cannot be accurately quantified as they depend on the amount of directed fishery on halibut and on whether effort is shifted to open areas where the incidence may be nearly as high. The annual incidental catch in this area has averaged about 3,000 mt. This closure is presently in effect for foreign fishermen. This closure and the one preceding, (c) above, are consecutive rather than concurrent so that foreign fisheries can be conducted in one part or another of the central and western Gulf of Alaska throughout the winter.

(c) Six "Kodiak Gear Areas", as described in Appendix I and shown in Figure 16—January 1–May 31 and August 10–December 31. To prevent conflicts between domestic fixed crab gear and foreign trawls and to prevent possible high incidental catches of crabs; identical closures are currently in effect.

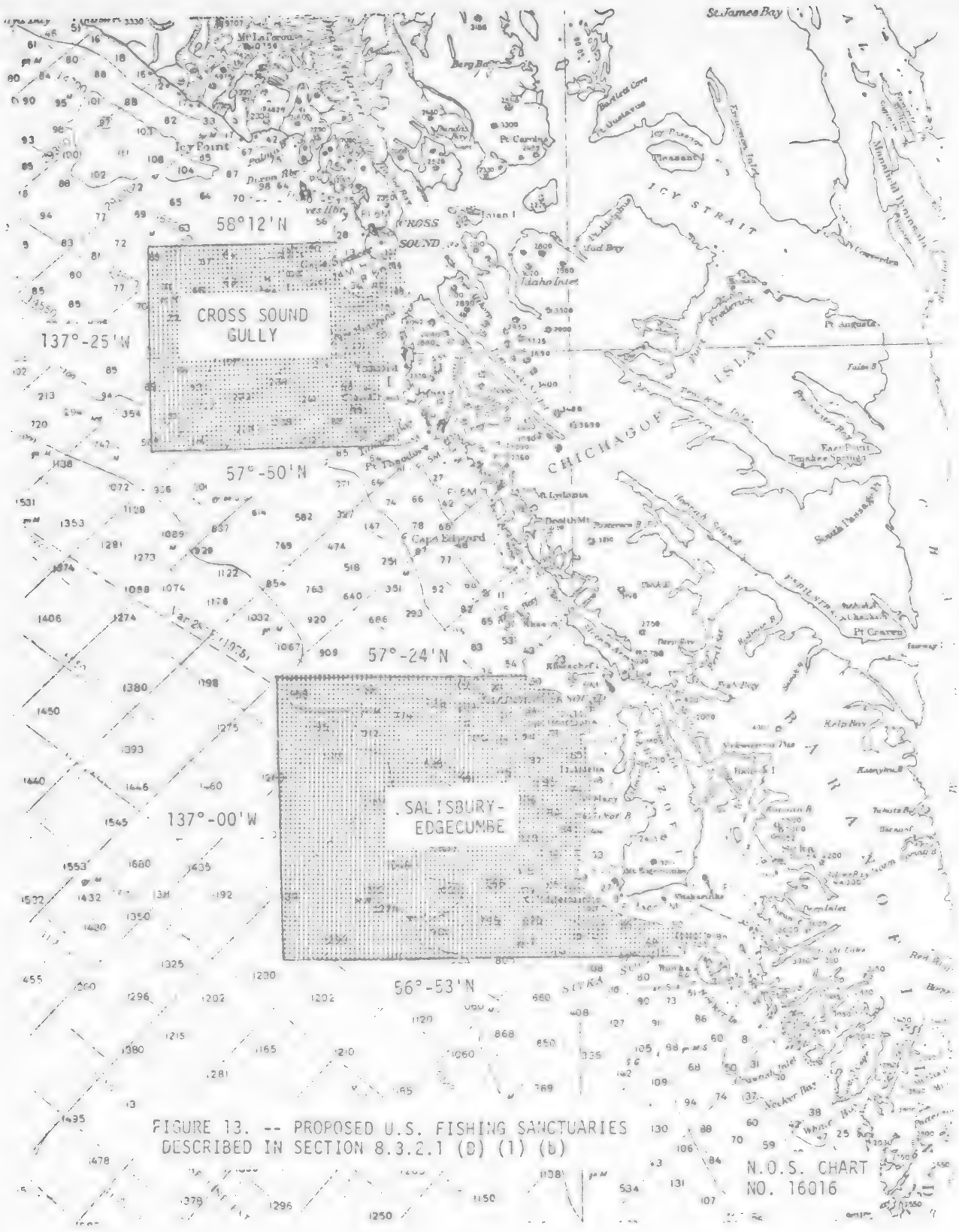


FIGURE 13. -- PROPOSED U.S. FISHING SANCTUARIES DESCRIBED IN SECTION 8.3.2.1 (D) (1) (b)

N.O.S. CHART NO. 16016

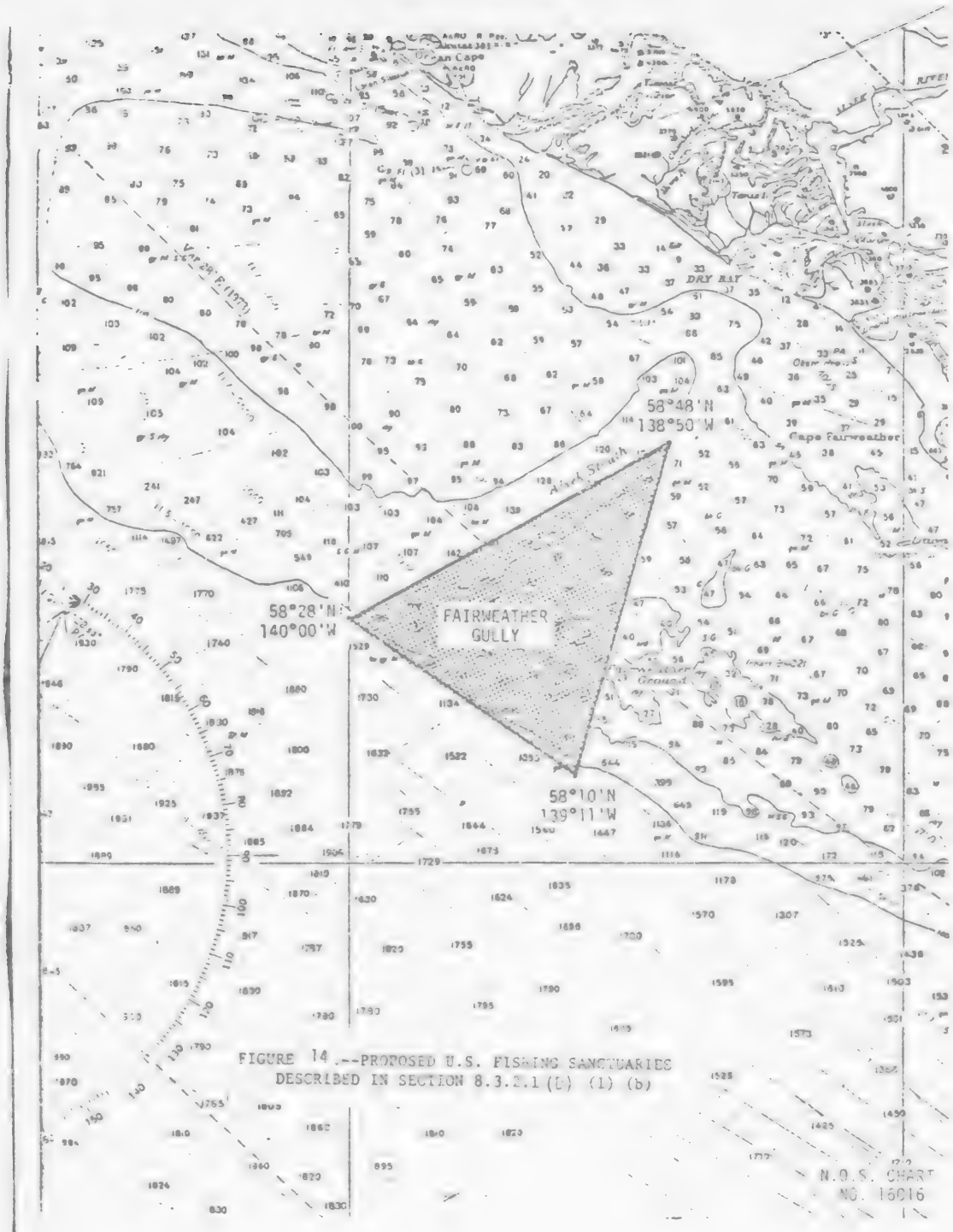


FIGURE 14.--PROPOSED U.S. FISHING SANCTUARIES DESCRIBED IN SECTION 8.3.2.1 (b) (1) (b)

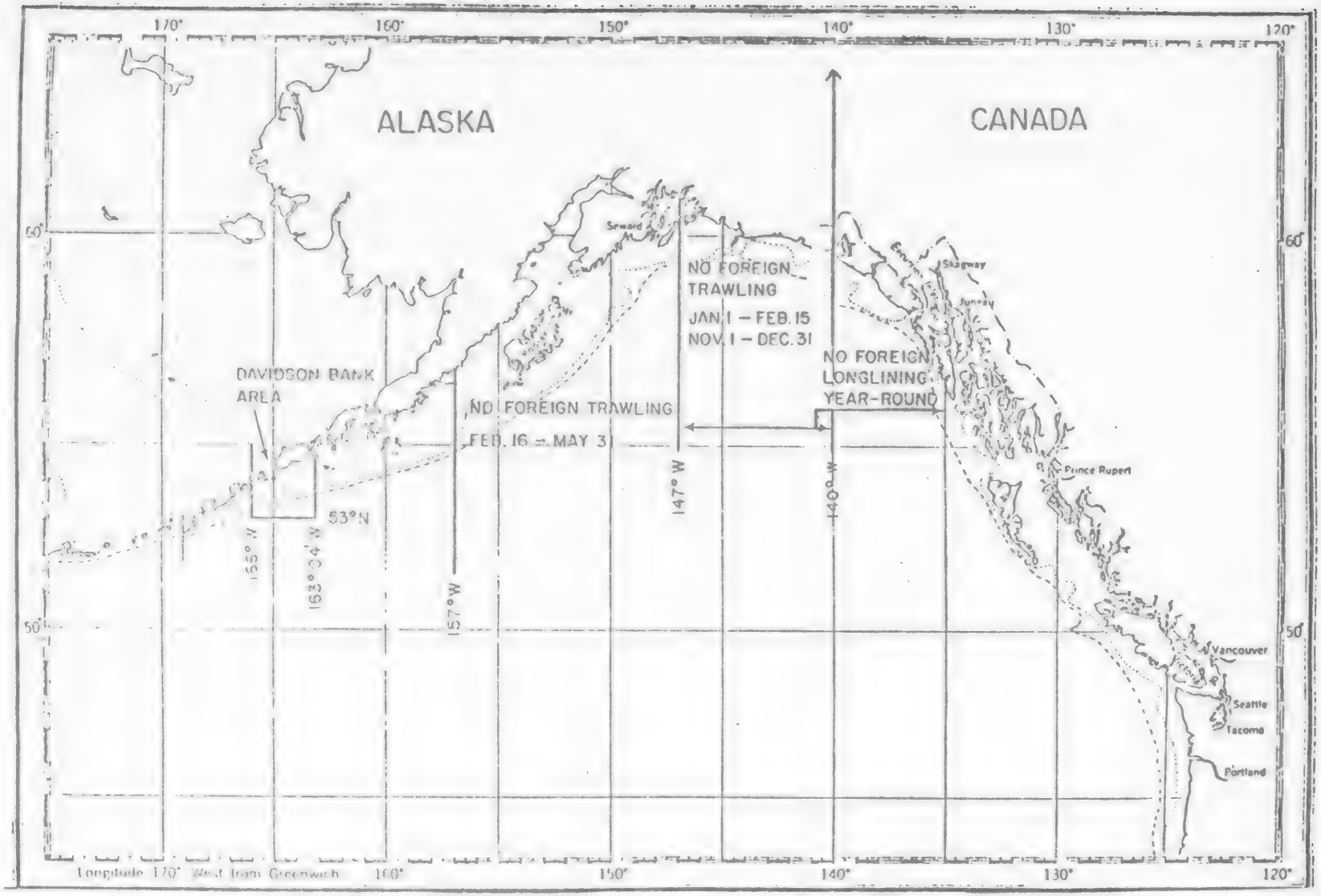


Figure 15.--"Davidson Bank" winter closures, and area closed to foreign sablefish fishing described in Sections 8.3.2.1. (0).

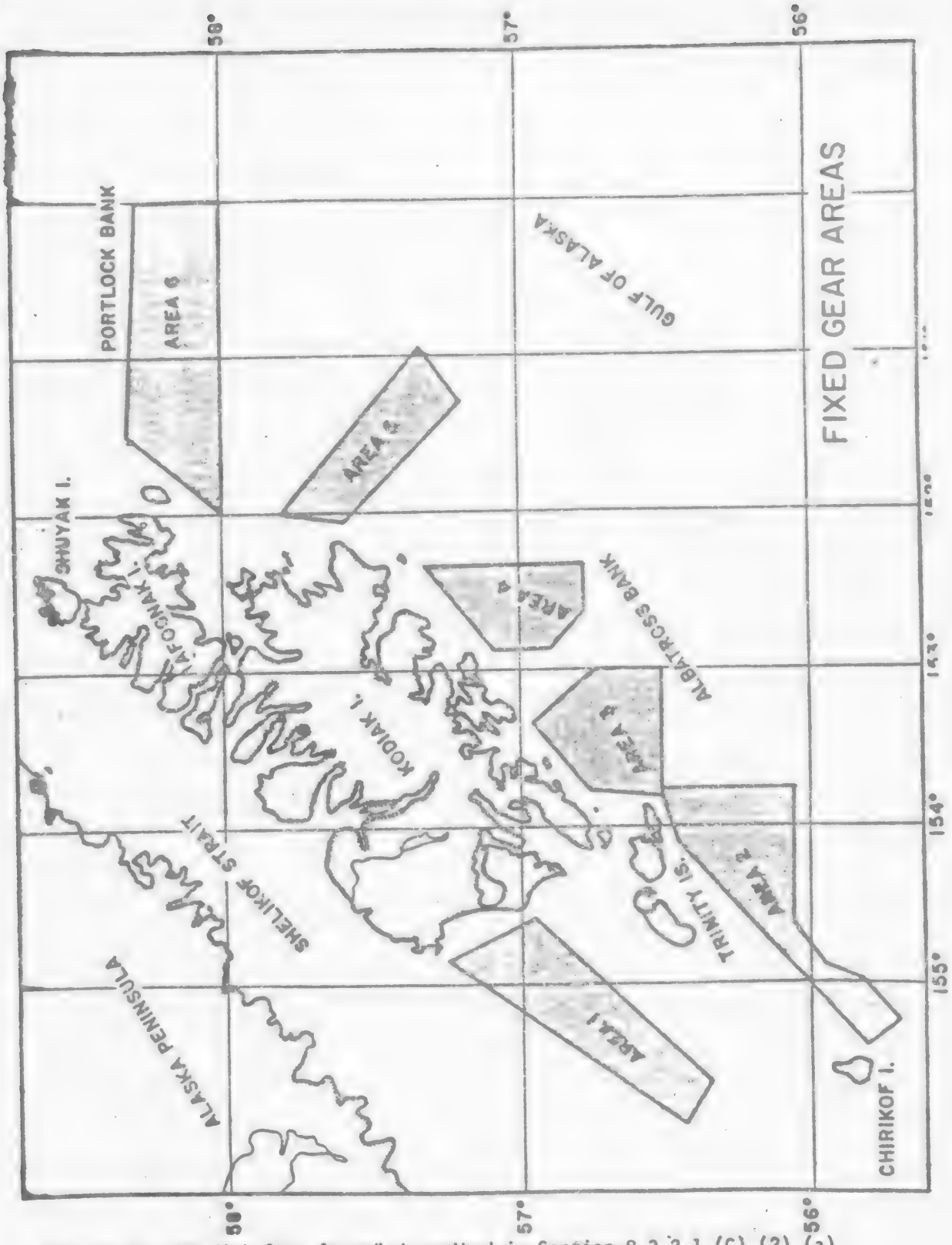
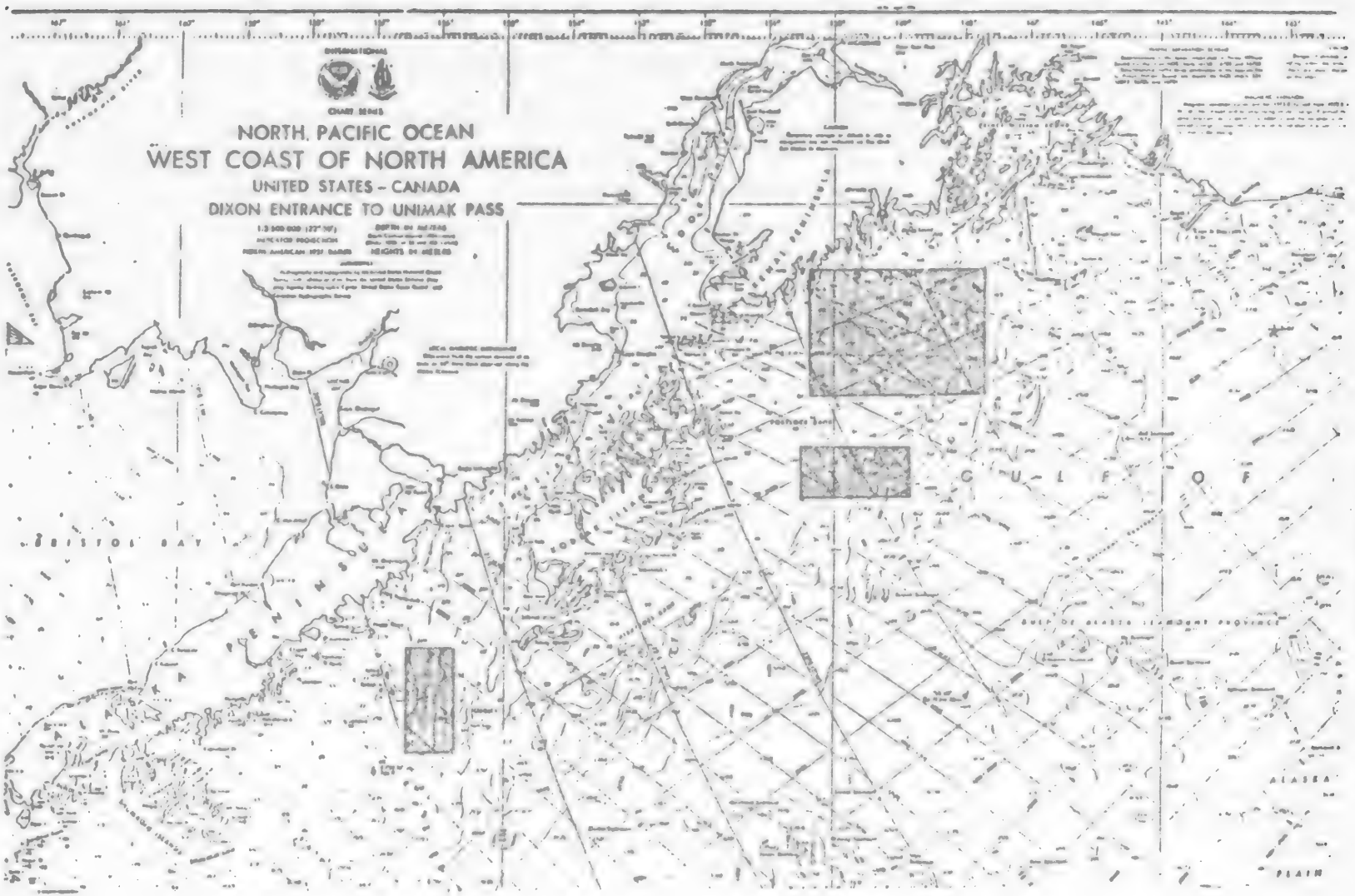


Figure 16.--"Kodiak Gear Areas" described in Section 8.3.2.1 (C) (2) (a).



" described in Section 8.3.2.1 (D)(2)(b).

(d) Three "Kodiak Halibut Areas," as described in Appendix I and shown in Figure 17—five days before to five days after the opening of the domestic halibut setline fishery. To allow halibut grounds to remain undisturbed prior to the opening of the halibut season and allow the initial halibut trip of the season to be made without interference from foreign trawlers; identical closures now in effect. This provision will be unnecessary unless the 1978 halibut season opens later than May 26 because of (2)(b), above.

(3) The following areas shall be closed year-around to foreign setline fishing:

(a) That portion of the Gulf of Alaska east of 140° W longitude. To prevent preemption of sablefish grounds and gear conflicts in the area where the U.S. sablefish fishery is expected to develop—this closed area encompasses all of Southeast, where there is no sablefish FAC, and 30 percent of Jakutat, leaving the other portion open for attainment of the prescribed 1,787 mt FAC in that area.

(b) The area east of 157° W longitude and landward of the 500 m isobath. To prevent take of juvenile sablefish which have not yet reached their "critical size" and are generally distributed in shallower water than the adults, and to prevent hooking mortality on juvenile halibut; this measure has been in force for several years.

(4) In the area west of 157° West longitude, a directed fishery for Pacific cod may be conducted only with longline gear, but shall be prohibited during the halibut season as established by the IPHC.

(E) Gear restrictions. (1) Net type. During the periods January 1-May 31 and December 1-31 only pelagic trawls,[14] with recording net-sonde devices functioning properly during each tow, may be used through the Gulf of Alaska during the time-area units not otherwise closed to trawling. To reduce the incidental catch of halibut during the period of highest incidental catches in the past. This restriction should still allow the opportunity for successful fishing for such pelagic and semi-demersal species as pollock, Pacific ocean perch, and Atka mackerel. Until this type of gear restriction is shown to be both practical and enforceable it should not be considered an adequate alternative to the winter trawl closures described in (C)(2) (a) and (b), above.

(2) Longline. In the area landward of the 500 meter isobath and west of 157° West longitude a directed fishery for Pacific cod may be conducted only by longline gear and is prohibited during the halibut season as established by IPHC.

(3) Sablefish longline fishery. Directed fisheries for sablefish may be conducted only with longline (hook & line) or pot gear.

8.3.2.2. Size and sex restrictions.

None.

8.3.2.3. Other regulations.

(A) Once a nation's allocation of any species or species group in a major statistical area is exceeded, that statistical area shall be closed to all fishermen of that nation for the remainder of the calendar year. To prevent overexploitation of relatively small stocks (many of which are important to domestic fishermen) in a fishery for more abundant species. This provision places the burden of responsibility on the foreign fishermen to develop selective gear or fishing practices which will minimize or eliminate incidental capture of non-target species.

(B) Foreign longlining landward of the 500 meter isobath, west of 157° West longitude, shall target only on Pacific cod and shall not be conducted during the halibit season as established by the IPHC.

8.3.3 Relationship of this management plan to existing laws and policies.

8.3.3.1 Other fishery management plans proposed by a Council or the Secretary.

This management plan can be considered an extension of the Preliminary Fishery Management Plan (PFMP) for the Gulf of Alaska Trawl Fishery and portions of the PFMP for the Sablefish Setline/Trap Fishery, both prepared and implemented by the Secretary of Commerce, and which are superceded by this plan.

There is also an implicit relationship to North Pacific Council management plans for the king and Tanner crab fishery, the Dungeness crab fishery, the scallop fishery, and the shrimp fishery in that this plan recognizes the need for possible emergency action to prevent conflicts with, or a conservation crisis in those other managed fisheries (see Section 8.3.1.1).

8.3.3.2 Federal law and policies.

The U.S. is party to the following international conventions which directly or indirectly address conservation and management needs of groundfish in the Gulf of Alaska: the International Convention For The High Seas Fisheries of the North Pacific Ocean (INPFC), and the Convention Between The United States of America and Canada For The Preservation Of The Halibut Fishery Of The Northern Pacific Ocean and Bering Sea (IPHC).

There are no Indian treaty fishing rights for groundfish in the fishery conservation zone in the Gulf of Alaska.

8.3.3.3 State laws and policies.

The Constitution of the State of Alaska states the following in Article XIII:

Section 2. General Authority. The legislature shall provide for the utilization, development, and conservaton of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people.

Section 4. Sustained Yield. Fish, forest, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses.

Section 15, No Exclusive Right of Fishery, has been amended to provide the State the power "to limit entry into any fishery for purposes of resource conservation" and "to prevent economic distress among fishermen and those dependent upon them for a livelihood".

These are the basic tenets by which the natural resources of Alaska are managed.

8.3.3.4 Other.

This plan has a most significant relationship to the management of the Pacific halibut fishery which continues to be vested in the International Pacific Halibut Commission. Many of the management measures contained herein are for the express purpose of mitigating a severe crisis in the domestic halibut fishery by recognizing a situation in which the trawl fishery (and possibly the foreign setline fishery) could be a major contributor to declining halibut abundance.

8.4 Enforcement requirements.

The existing and projected joint Coast Guard-NMFS fisheries enforcement patrols are geared to policing the wide range of foreign fisheries throughout the Alaska Region. In so doing, the individual patrols are seldom devoted to enforcement of a single management plan but rather monitor compliance with all plans and other statutory responsibilities pertinent to the area covered by that patrol. Enforcement of this plan is somewhat unique because the plan encompasses all the permitted foreign fishing in the Gulf of Alaska (except Canadians under separate agreement) and all the restrictions against foreign retention of prohibited species, i.e., salmon, halibut, crab. Therefore, the major share of the multimission patrols in the Gulf of Alaska can be prorated to enforcement of this plan.

Prior to the implementation of the FCMA, a task force of Coast Guard-NOAA/NMFS representatives prepared a joint report on foreign enforcement requirements using historical fishing patterns as a basis. It is estimated from this plan that the Coast Guard will devote about 315 ship days and 2,800 aircraft hours to foreign enforcement. Of that patrol time, it is estimated that about 75 percent will be directed toward enforcement of this plan. Following proven procedures, these patrols will, whenever possible, be accompanied by NMFS fisheries enforcement specialists. As noted, the above requirements are directed at foreign fisheries enforcement. The impact of domestic fisheries on enforcement planning is dependent on two as yet unresolved factors. First, the type of domestic regulations would play a large role in determining the need for at sea enforcement. Complex rules, e.g., area closures and gear restrictions, would require enforcement effort at sea. Simple rules, wherein only a quota is established for U.S. fishermen, could be enforced dockside at minimal cost. Second, the size of the domestic fleet is an important factor. A small domestic fishery could be largeley patrolled in conjunction with the current and planned foreign fishing surveillance. Domestic effort within the 12 mile zone which is closed to foreign fishing could be patrolled by the use of small Coast Guard vessels at a lesser cost. On the other hand a large domestic fishing effort may replace the foreign vessels outside the 12 mile line with U.S. vessels inside the line. In that case, it may be desirable to enter into an agreement with the Alaska Department of Public Safety for assistance in conducting domestic enforcement close to shore. Some combination of the larger foreign fishing patrol units, the smaller Coast Guard vessels and some agreement with ADPS might prove to be the best solution for domestic enforcement.

8.5 Reporting requirements.

8.5.1 Domestic.

Fishery statistics, including value of the catch, shall be reported within 7 days of the date of landing in a format that is at least as comprehensive as Level 2 of the Coastwide Data System, and compiled by months. In addition to elements identified in Level 2 reporting, fishing effort (e.g., days out of port, days on the grounds, or number of landings) should also be reported. Level 2 reporting includes the following:

[14] A "pelagic" trawl is one in which neither the net nor the otter boards operate in contact with the bottom. The net-sonde readout shall clearly indicate that during no more than 10 percent of any tow was the footrope of the net in contact with the bottom. No chafing gear, rollers, or bobbins are permitted.

Vessel Registration/Gear Licensing

U.S.C.G. document No. _____
State agency boat plate No. _____
State marine board No. _____
Vessel length _____
Gear type(s) _____

Landing/Fish Receipt

Port of landing _____
Date of landing _____
Area of catch _____
State agency boat plate No. _____
Species and pounds _____
Gear type(s) _____
Value of catch _____
Ticket No. _____

Area of catch should be compatible with the major statistical area described in this plan. Where possible, such reporting should be augmented with fishermen interviews and verification of data by logbook review.

With regard to the timeliness of reporting, all elements of the above format should be available to the Council, in summary form (e.g., catch by species, by vessel class and gear type, by major statistical area, and by month) no later than 3 months after the end of the month of record. Annual summary reports of final fishery statistics and computer tapes, cards, or disks containing the basic fishery data of Level 2 reporting in accordance with applicable State and Federal statutes regarding confidentiality of data should be available to the Council by July of the following year.

8.5.2 Foreign.

(A) Monthly reports. In addition to the annual statistical report described below, each nation will report by the end of the following month, provisional fishery information as follows: Effort in vessel-days on the grounds by vessel class and gear-type; and catch in metric tons of flounders, Pacific ocean perch, other rockfishes, cod, pollock, sablefish, Atka mackerel, squid, and others, for each of the following areas (Figure 1): Southeastern, Yakutat, Kodiak, Chirikof (east and west of 157° W.1. for Pacific cod only). Shumagin.

(B) Annual reports. Each nation whose fishermen operate in the Region shall report by May 30 of the following year annual catch and effort statistics, as follows: Effort in hours trawled, by vessel class, by gear type, by month, by ½° (lat) x 1° (long) statistical area; catch in metric tons, by vessel class, by gear type, by month, by ½° (lat) x 1° (long) statistical area, by the following species groupings: rocksole, flathead sole, arrowtooth flounder, other flounders, Pacific ocean perch, other rockfishes, Pacific cod, sablefish, Alaska pollock, Atka mackerel, squid, any other species taken in excess of 1,000 metric tons, and other fishes.

(C) Fleet disposition reports. The operator of each foreign vessel shall report by radio, at least 24 hours in advance, the date, time and position at which fishing activities will begin in the Gulf of Alaska. Similar reports will be made when ceasing fishing activities in the Gulf. Reports will also be required when vessels shift operations to different statistical areas within the Gulf of Alaska.

Those reports, supplemented by U.S. patrol sighting and monthly catch and effort reports, are required to monitor adherence to catch limitations.

8.6 Observers.

All fishing vessels operating in this management unit will make available, at no cost to the United States, accommodation for one (two on motherships) technical observer. Observers will be assigned to individual vessels and for periods at the discretion of the U.S. Government (for foreign vessels) or the Alaska Department of Fish and Game (for domestic vessels) to: measure catch rates; estimate species, size, and age composition of the catch; collect other biological data; determine location and duration of hauls or sets; and observe gear configuration and performance.

8.7 Cooperative research requirements.

Foreign fishery research in which fishing gear capable of taking commercial quantities of any fishery resource must either be conducted in cooperation with a federal or state fishery agency or with an appropriate domestic university, or must be covered by a permit issued by the Secretary for a foreign commercial operation.

To be considered "cooperative," detailed research plans must be developed jointly with U.S. scientists, and approved by the appropriate NMFS Fisheries Center at least 90 days prior to the commencement of field operations. Unless specifically exempted, such field operations must include participating U.S. scientists, technicians, or observers. Cooperative research ventures will only be entered into when they are found to be in the best regional interest of the U.S.

Requests for cooperative research may be initiated by either U.S. or foreign scientists.

8.8 Permit requirements.

8.8.1 Domestic.

All U.S. fishing vessels operating in that part of the Gulf of Alaska groundfish fishery which is under Council jurisdiction must have a permit issued by the Secretary of Commerce or, if considered acceptable by the Secretary of Commerce, a State of Alaska vessel license.

8.8.2 Foreign.

All foreign fishing vessels (as defined in Pub. L. 94-265) operating in the Gulf of Alaska groundfish fishery must have aboard a valid permit issued by the Secretary of Commerce.

8.9 Financing requirements.

8.9.1 Management and enforcement costs.

ESTIMATED MANAGEMENT COSTS

[In thousands of dollars]

40 man-months of foreign fishery observers	[1]112
15 percent of North Pacific Council fiscal year 1978 budget (less contracts)	90
NMFS Alaska region fishery operations branch	60
20 man-months of domestic fishery observers	50
Research activities, e.g., stock assessment, by NWAFC	.....
Review and revision of FMP by SSC	.....
Review and revision of FMP by management team	7
Computerized data analyses—NMFS	5
Improve State of Alaska statistical system	[2]124

[1]Reimbursed by foreigners to general fund, U.S. Treasury.

[2]For fiscal year 1977; additional $63,300 in fiscal year 1978.

ESTIMATED ENFORCEMENT COSTS

[In thousands of dollars]

236 Coast Guard ship patrol days	825
2,100 Coast Guard aerial patrol hours	1,650
NMFS Alaska region law enforcement branch	230
NMFS/NOAA administration of civil penalties	8
U.S. Attorney administration of criminal penalties	2
Computerized data analyses—NMFS	8
Domestic enforcement by small Coast Guard vessels or by an "enforcement contract" with State of Alaska, or by a combination of the 2	Unknown

8.9.2 Expected State and Federal revenues, taxes, fees.

Federal revenue expected in 1978 from charges placed on foreign fishing operations in the Gulf of Alaska is estimated to be near that of 1977—approximately $1.9 million.

The projected domestic groundfish catch (including halibut) for shore-based processing will be around 49,650 mt from which total state revenues generated by taxes and licenses will be roughly $1.5 million.

9.0 Statement of Council intentions to review this plan after approval by the Secretary.

The North Pacific Fishery Management Council will, after approval and implementation of this plan by the Secretary, maintain a continuing review of the fisheries managed under this plan by the following methods:

(1) Maintain close liaison with the management agencies involved, usually the Alaska Department of Fish and Game and the National Marine Fisheries Service, to monitor the development of the fisheries and the activity in the fisheries.

(2) Promote research to increase their knowledge of the fishery and the resource, either through Council funding or by recommending research projects to other agencies.

(3) Conduct public hearings at appropriate times and in appropriate locations, usually at the close of a fishing season and in those areas where the fishery is concentrated, to hear testimony on the effectiveness of the management plans and requests for changes.

(4) Consideration of all of the information gained from the first three activities and development, if necessary, of amendments to the management plan. Hold public hearings on the amendments prior to sending them to the Secretary for adoption.

10.0 References.

Section 3.1 Areas and stocks involved.

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11.0 Appendices.
11.1 Appendix.

Descriptions of closed areas given in Section 8.3.2.1 and shown in Figures 13A-13D.

A. Three "U.S. fishing sanctuaries"—8.3.2.1 (C)(1)(b).

(1) *Salisbury-Edgecumbe:* between 57°24′ North Latitude and56°53′ North Latitude east of 137°00′ North Latitude east of 137°00′ West Longitude.

(2) *Cross Sound Gully:* between 57°50′ North Latitude and 58°12′ North Latitude east of 137°25′ West Longitude.

(3) *Fairweather Gully:* the area bounded by straight lines connecting the following coordinates in the order listed:

North latitude	*West longitude*
58°28′	140°00′
58°48′	138°50′
58°10′	139°11′
58°28′	140°00′

B. "Davidson Bank"—8.3.2.1 (C)(1)(c). Between 163°04′ and 166°00′W north of 53°00′ N.

C. Six "Kodiak gear" areas—8.3.2.1 (C)(2)(a). Straight lines connecting each of the following coordinates, in the order listed:

(1)

North latitude	*West longitude*
57°15′	154°51′
56°57′	154°34′
56°21′	155°40′
56°26′	155°55′
57°15′	154°51′

(2)

North latitude	*West longitude*
56°27′	154°06′
55°46′	155°27′
55°40′	155°17′
55°48′	155°00′
55°54′	154°55′
56°03′	154°36′
56°03′	153°45′
56°30′	153°45′
56°30′	153°49′
56°27′	154°06′

(3)

North latitude	*West longitude*
56°30′	153°49′
56°30′	153°00′
56°44′	153°00′
56°57′	153°15′
56°45′	153°45′
56°30′	153°49′

(4)

North latitude	*West longitude*
57°05′	152°52′
56°54′	152°52′
56°46′	152°37′
56°46′	152°20′
57°19′	152°20′
57°05′	152°52′

(5)

North latitude	*West longitude*
57°35′	152°03′
57°11′	151°14′
57°19′	150°57′
57°48′	152°00′
57°35′	152°03′

(6)

North latitude	*West longitude*
58°00′	152°00′
58°00′	150°00′
58°12′	150°00′
58°19′	151°29′
58°00′	152°00′

(D) Three "Kodiak halibut" areas—8.3.2.1 (C)(2)(b). In the event that the 1978 United States halibut setline fishing season opens after May 10, 1978, the following areas bounded respectively by straight lines connecting in each of the following groups the coordinates in the order listed are closed from 5 days prior to 5 days after the opening of the U.S. halibut setline fishery:

(1) 58°30′N to 59°30′N, between 147°40′W and 150°20′W

(2) 57°40′N to 58°05′N, between 148°50′W and 150°30′W

(3) 55°30′N to 56°25′N, between 155°45′W and 156°30′W

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